ISAHP 2016

2016

LONDON, UK

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MESSAGE FROM THE FOUNDER OF THE AHP AND ANP DISCIPLINES

Welcome to ISAHP2016 and welcome to London, England! Thanks to all of you for your extraordinary effort to attend this meeting! We know that the times are uncertain with the recent BREXIT vote for Britain to exit from the Eurozone, and the turmoil in the world financial situation, so we especially appreciate the effort it took for you to attend this conference. I want to express my thanks to the ISAHP2016 Conference Chairman Leandro Pecchia, and his co-chairs, Antonella Petrillo, Andrea Genovese and Marjan Hummel, and to Enrique Mu, Director of the Executive Committee of the International Symposium of the Analytic Hierarchy Process and to Maestro Meetings and its personnel, led by Milagros Pereyra-Rojas, assisted by Pilar Rodriguez Blanco and Maria Soledad Cabezas, that handled the organizational details of the meeting beautifully, and especially to Elena Rokou, Executive Research Director of Creative Decisions Foundation, who played a major role in every aspect of the conference.

Without all of you wonderful people who managed the organization, the many track chairs who worked so hard to put the program together, and, especially, the authors who expended blood, sweat and tears to write their papers, this conference would not have been possible.

Examples of what I want to mention are applications of AHP/ANP in Politics and to the workings of the neurons with real, complex, quaternionic and octonionic numbers. This kind of work is now behind us, so relax and enjoy the conference and London!

Thomas L. Saaty
Founder of the AHP and ANP disciplines
Distinguished University Professor
University of Pittsburgh, Pittsburgh, Pennsylvania, USA

MESSAGE FROM THE CEO CREATIVE DECISIONS FOUNDATION

We are pleased to welcome you to London, Great Britain, for the 2016 ISAHP conference. My husband, Thomas Saaty, the creator of the AHP/ANP, a theory of measurement that is often used in decision making with intengibles, turned 90 in July this year, so this ISAHP is a very special celebration. It is the 14th such International Symposium on the AHP. Our thanks to all of you, our longtime colleagues and friends from around the world, who are attending this conference. We look forward to seeing and talking with each and every one of you!

Rozann Saaty
CEO Creative Decisions Foundation
4922 Ellsworth Avenue
Pittsburgh, Pennsylvania, USA

MESSAGE FROM THE PROGRAM CHAIR

It is my extraordinary pleasure to welcome you all to the ISAHP2016 meeting and welcome you all in Europe and in London! As stated in Washington, it is time for AHP/ANP to get out of the toolbox of multi-criteria decision-making experts and to become the tool of everyday decision makers, as it was in the original intention of Tom. At this regard, the ISAHP2016 keynote speakers will give us a comprehensive exemplar of how AHP/ANP can serve in real life to face complex decisions. In addition, 4 invited talks have been organized inviting emerging colleagues to present how they are using AHP/ANP today, giving us an impression of what AHP/ANP can be in the future years. The motto chosen for this edition was "Divide, compara. aggrega et impera", inspired by the ancient "Divide et Impera", to highlight the continuous attempt of human beings in developing methods to solve complex problems otherwise not solvable.

I am confident that keynote talks, invited talks, your incredibly rich submissions and the fantastic location will make this a wonderful conference. Seven scientific journals have offered the opportunity to organize seven special issues related to the ISAHP2016, highlighting how relevant our production is for the scientific community.

Please enjoy the scientific event, but take also as much time as you can to enjoy the friendship that has been one of the strong drivers of our community since I have fond memories of the ISAHP meetings.

Leandro Pecchia
ISAHP 2016 Chairman

MESSAGE FROM THE EXECUTIVE ORGANIZING COMMITTEE

It is my pleasure to welcome you to ISAHP2016. This time in the beautiful city of London, U.K. It seems like yesterday that we met in Washington, DC but it has been only two years. I have thought recently about why we long for our biennial ISAHP meeting and have concluded that the main reason is that our ISAHP events usually feel more like family reunions than academic gatherings. We are all looking forward to meet again with our friends and colleagues and catch up with their new exciting research and experiences. This London event is no different, and for this reason I invite you to enjoy ISAHP2016; to share your knowledge with our community of practice and to revel in our friendship and common interests in this beautiful city.

Enrique Mu, PhD
President
Executive Committee, ISAHP

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TRACK CHAIRS

TRACK #1: MULTI-CRITERIA DECISION ANALYSIS METHODOLOGY AND THEORY

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ISAHP2016 SUMMARY SCHEDULE

THURSDAY AUGUST 4			
Time	**Room**	**Title**	**Presenter**
12:00 to 5:00pm	Atrium	**Registration**	
1:00 to 2:00 pm	Great Western 2	Workshop: User-need elicitation via AHP: study design and piloting	Leandro Pecchia, University of Warwick, UK
2:00 to 3:00 pm	Great Western 2	Workshop: ANP Sensitivity Workshop ISAHP 2016	William Adams, Decision Lens Inc, U.S.
3:00 to 3:30 pm	Atrium	**Coffee Break**	
3:30 to 4:30 pm	Great Western 2	Workshop: Overview of the new Super Decisions software (V3.0) for the Analytic Hierarchy Process (AHP) and Analytic Network Process (ANP)	Rozann W. Saaty, Creative Decisions Foundation, U.S.
4:30 to 5:30 pm	Great Western 2	Workshop: Simplifying AHP to Make It Accessible to Youth	William Adams, Decision Lens Inc, U.S.
6:00 to 8:00 pm	Atrium	**Welcome Reception**	

FRIDAY AUGUST 5			
9:00 am to 3:00 pm	Atrium	**Registration**	
9:00 to 10:00 am	Great Western 1	Plenary Session - Opening Ceremony	Thomas L. Saaty, University of Pittsburgh, U.S.
10:00 to 10:40 am	Atrium	**Coffee Break**	
10:40 to 11:40 am		Break Out Sessions	
12:00 to 1:00 pm		Break Out Sessions	
1:00 to 2:30 pm	Atrium	**Lunch & Poster Session 1**	
2:30 to 3:30 pm	Great Western 1	Plenary Session	Adriana Velazquez Berumen, Essential Medicines and Health Products Department in the World Health Organization, Geneva, Switzerland
3:30 to 4:00 pm	Atrium	**Coffee Break**	
4:00 to 5:00 pm		Break Out Sessions	
5:15 to 6:15 pm		Break Out Sessions	

SATURDAY AUGUST 6			
Time	**Room**	**Title**	**Presenter**
9:00 am - 3:00pm	Atrium	**Registration**	
9:00 to 10:00 am	Great Western 1	Plenary Session	James G. Dolan, M.D. University of Rochester, Rochester, USA
10:00 to 10:40 am	Atrium	**Coffee Break**	
10:40 to 11:40 am		Break Out Sessions	
12:00 to 1:00 pm		Break Out Sessions	
1:00 to 2:30 pm	Atrium	**Lunch & Poster Session 2**	
2:30 to 3:30 pm	Great Western 1	Plenary Session	Edgardo Iozia European Economic and Social Committee, Belgium, Brussels
3:30 to 4:00 pm	Atrium	**Coffee Break**	
4:00 to 5:00 pm		Break Out Sessions	
5:15 to 6:15 pm		Break Out Sessions	
6:30 to 12:00 pm		**Social Networking Event & Bus Tour**	

SUNDAY AUGUST 7			
9:00 to 10:00 am	Great Western 1	Plenary Session	Prasanta Kumar De Aston University, Birmingham, UK
10:00 to 10:40 am	Atrium	**Coffee Break**	
10:40 to 11:40 am		Break Out Sessions	
12:00 to 1:00 pm		Break Out Sessions	
1:00 to 2:30 pm	Atrium	**Lunch & Closing Ceremony**	

BREAK OUT SESSIONS SUMMARY SCHEDULE

FRIDAY AUGUST 5 - BREAK OUT SESSIONS	
FRIDAY 10:40 to 11:40 am	
Campanula	**3.1 Healthcare Decision Making**
INTEGRATING AHP INTO EUNETHTA CORE MODEL: THE DECISION-ORIENTED HEALTH TECHNOLOGY ASSESSMENT (DOHTA) METHOD	Matteo Ritrovato, Bambino Gesù Children's Hospital; Francesco Cosimo Faggiano, Bambino Gesù Children's Hospital; Giorgia Tedesco, Bambino Gesù Children's Hospital; Martina Andellini, Bambino Gesù Children's Hospital; Pietro Derrico, Bambino Gesù Children's Hospital
DECISION-ORIENTED HTA FOR COMPARING THREE-DIMENSIONAL (3D)/TWO-DIMENSIONAL (2D) LAPAROSCOPIC DISPLAY SYSTEMS IN A VARIETY OF PEDIATRIC SURGICAL PROCEDURES	Martina Andellini, Bambino Gesù Children's Hospital; Giorgia Tedesco, Bambino Gesù Children's Hospital; Francesco Cosimo Faggiano, Bambino Gesù Children's Hospital; Pietro Derrico, Bambino Gesù Children's Hospital; Matteo Ritrovato, Bambino Gesù Children's Hospital
ASSESSMENT OF ROBOT-ASSISTED SURGERY IN A CHILDREN'S HOSPITAL BY APPLYING THE "DOHTA" METHOD	Giorgia Tedesco, Bambino Gesù Children's Hospital; Martina Andellini, Bambino Gesù Children's Hospital; Francesco Cosimo Faggiano, Bambino Gesù Children's Hospital; Pietro Derrico, Bambino Gesù Children's Hospital; Matteo Ritrovato, Bambino Gesù Children's Hospital

Great Western 2	6.1 Business and Innovation Systems
SYSTEMATIC DECISION SUPPORT IN STRATEGY IMPLEMENTATION – A PROCESS FRAMEWORK AND APPLICATION OF α-CUT FUZZY ANP	Ludwig Sedlmeier, University of St. Gallen; Teresa Christmann-Schwaab, University of St. Gallen; Constantin Schnupp, University of St. Gallen (CH); Klaus Möller, University of St. Gallen
THE ANALYTIC NETWORK PROCESS IN MODELING AND COORDINATION OF DYNAMIC SUPPLY NETWORKS	Petr Fiala, University of Economics, Czech Republic
USING AHP IN QFD – THE IMPACT OF THE NEW ISO 16355 STANDARD	Thomas Michael Fehlmann, Euro Project Office AG; Glenn Mazur, QFD Institute, International Council for QFD, University of Michigan
KingFisher	2.1 Government Policy and Decision Making
ANP MODEL FOR ASSESSING SOCIO-ENVIRONMENTAL VULNERABILITY OF A RARAMURI COMMUNITY IN MEXICO	Luis Antonio Bojórquez-Tapia, LANCIS UNAM, Mexico; Daniela Antonio Pedroza, Laboratorio Nacional de Ciencias de la Sostenibilidad
ASSESSING THE RESPONSIBILITY TOWARDS CLIMATE CHANGE OF RESEARCH PROJECTS BY MEANS OF ANALYTIC HIERARCHY PROCESS	Tomas Gomez-Navarro, Universitat Politècnica de València; Iván Ligardo-Herrera, Universitat Politècnica de València

GOVERNMENT POLICIES FOR ECOTOURISM DEVELOPMENT IN MANGROVE FORESTS OF IRAN	Marzieh Hajjarian, Assistant Professor/Natural Resources/Urmia University; Omid Hosseinzadeh, Assistant Professor; Farideh Delavari, PhD; Reza Abdi, Professor/Bradford University
Redstar	**5.1 Industrial and Manufacturing Engineering**
DECISION ANALYSIS IN AN EMERGENCY DEPARTMENT TO EVALUATE THE OVERALL PERFORMANCE: A METHOD BASED ON AHP AND TOPSIS	Miguel Angel Ortiz Barrios, Universidad de la Costa, Colombia; Brandon Antonio Aleman Romero, Department of Industrial Engineering, Universidad de la Costa CUC, Barranquilla, Colombia; Janeth Rebolledo Rudas, Department of Quality Assurance, E.S.E. Hospital Niño Jesus, Barranquilla, Colombia; Heberth Maldonado Mestre, Department of Teaching, E.S.E. Hospital Niño Jesus, Barranquilla, Colombia; Arlet Beatriz Cataño Gonzalez, Department of Health Sciences, Universidad Libre, Barranquilla, Colombia; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Antonella Petrillo, University of Naples "Parthenope", Italy
A MATHEMATICAL MODELLING APPROACH FOR MULTI-OBJECTIVE, MULTI-STAGE HYBRID FLOW SHOP SCHEDULING PROBLEM	Mujgan Sagir Ozdemir, ESOGU, Turkey
AHP MODEL FOR SELECTING PACKAGING SYSTEMS IN FOOD INDUSTRY	Astrid Maria Oddershede, USACH, Chile; Cristian Andres Mejias, USACH; Luis Quezada, Department of Industrial Engineering, Universidad de Santiago de Chile

FRIDAY 12:00   to 1:00 pm

Campanula	3.2 Healthcare Decision Making
AHP IN EHEALTH: THE MISSING PUZZLE BETWEEN (USER'S') NEEDS ELICIATION, REQUIREMENTS DESIGN AND SPECIFICATION WRITING.	Giuseppe Fico, Universidad Politécnica de Madrid; Maria Teresa Arredondo, Universidad Politécnica de Madrid
ANALYTIC HIERARCHY PROCESS TO INFORM DISABILITY HOUSING DEVELOPMENT: TWO APPLICATIONS	Ali Lakhani, Griffith University; Heidi Zeeman, Griffith University
IS THERE A TRADEOFF BETWEEN MULTICRITERIA DECISION ANALYSIS EASE OF USE AND RIGOR?	James Dolan, University of Rochester; Olena Cherkasky, University of Rochester; Peter Veazie, University of Rochester

Great Western 1	1.1 Multi-criteria Decision Analysis Methodology and Theory
AHP FOR STUDENT DECISIONS IN A MONTESSORI ELEMENTARY CLASS	William Adams, Decision Lens Inc, U.S.

Great Western 2	6.2 Business and Innovation Systems
ROUGH-RULES-BASED DECISION MODEL FOR MULTIPLE OBJECTIVES PORTFOLIO OPTIMIZATION	Kao-Yi Shen, Chinese Culture University; Gwo-Hshiung Tzeng, National Taipei University

USE OF AHP-BASED CLUSTERING ANALYSIS FOR EVALUATING CITIES IN TURKEY ACCORDING TO CONSUMPTION EXPENDITURES	Kamil Çelik, Gazi University; Asli Calis, Gazi University; Alptekin Sokmen, Gazi University; Cevriye Gencer, Gazi University
AN INTEGRATED AHP AND WEIGHTED FUZZY GOAL PROGRAMMING MODEL FOR IS PROJECT SELECTION	Mohammed Bellahcene, Management Departement, Tlemcen University, Algeria; Mohammed Mekideche, Tlemcen University; Fatima Zohra Benamar, Tlemcen University
KingFisher	**2.2 Government Policy and Decision Making**
ANALYSIS OF THE SAUDI NATIONAL TRANSFORMATION PROGRAM/ ANP APPLICATION	Asma M Bahurmoz, King Abdulaziz University, Saudi Arabia; Hussein Mohammed Alkahily, Independent Finance Consultant
RANKING TERRORIST NODES OF 9/11 NETWORK USING ANALYTICAL HIERARCHY PROCESS WITH SOCIAL NETWORK ANALYSIS	Pankaj Choudhary, Defence Institute of Advanced Technology,Pune; Upasna Singh, Department of Computer Engineering Defence Institute of Advanced Technology
SOCIAL INNOVATIVE POLICIES USING LOCAL KNOWLEDGE TRANSFER: AHP/ANP MODELS FOR THE ROMANIAN COOPERATIVE STRUCTURES	Adriana Agapie, Bucharest University of Economic Studies, Romania
Redstar	**5.2 Industrial and Manufacturing Engineering**

AN EMPIRICAL INVESTIGATION ON HOW ANALYTIC NETWORK PROCESS GROUP DECISION MAKING INFLUENCES PROJECT RISK MANAGEMENT	Omid Hosseinzadeh, Assistant Professor; Marzieh Hajjarian, Assistant Professor/Natural Resources/Urmia University; Reza Abdi, Professor/Bradford University
DEVELOPMENT A KEY COMPETITIVENESS INDICATORS FOR DISASTER MANAGEMENT	Antonella Petrillo, University of Naples "Parthenope", Italy; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Federico Zomparelli, University of Cassino and Southern Lazio
USING AHP METHOD FOR EXPERTS PREFERENCE ANALYSIS IN RISK MANAGEMENT OF PROTECTED AREAS: A CASE STUDY IN VIETNAM	Huong Quynh Nghiem, University of Greifswald, Germany

FRIDAY 1:00   to 2:30 pm

Atrium	Poster Session 1	
A NUMERICAL EXPERIMENT ON THE POSSIBILITY OF GETTING THE SOLUTION WITH MUCH LESS PAIRWISE COMPARISONS	Robin Rivest, HEC Montreal	
MULTI-CRITERIA ANALYSIS OF ALTERNATIVE POWER GENERATION IN PARAGUAY	José Saldaña, Facultad Politécnica, UNA; Diego Martínez, Facultad Politécnica, UNA; Félix Fernández, Facultad Politécnica, UNA; Raúl Emilio Amarilla, Polytechnic Faculty, National University of Asuncion;	

	Gerardo Alejandro Blanco, Polytechnic Faculty, National University of Asuncion; Victorio Oxilia, Facultad Politécnica, UNA
METHODOLOGICAL APPROACH TO FORMULATE PRODUCTION AND OPERATIONS STRATEGIES IN THE SMES USING THE ANP METHODOLOGY	Alexis Olmedo, Andres Bello University, Chile
BEST ALTERNATIVE MODELS TO INCREASE LOCAL PRODUCT CONSUMPTION	Puren Veziroglu, Cukurova University; Kenan Ciftci, Ege University; Bulent Miran, Ege University; Ayca Nur Sahin, Ege University; Faruk Emeksiz, Cukurova University
FRIDAY 4:00 to 5:00 pm	
Campanula	**1.2 Multi-criteria Decision Analysis Methodology and Theory**
AN INTERACTIVE PROCEDURE TO DETERMINE THE ELEMENTS OF A PAIRWISE COMPARISON MATRIX	Jozsef Temesi, Corvinus University of Budapest, Hungary
AN OPTIMIZATION APPROACH FOR THE EIGENVECTOR METHOD	János Fülöp, MTA SZTAKI, Hungarian Academy of Sciences
ANALYSES OF PAIRWISE COMPARISONS WITH A TERNARY DIAGRAM	Takafumi Mizuno, Meijo University, Japan; Kouichi Taji, Nagoya University

Great Western 2	6.3 Business and Innovation Systems
A DECISION APPROACH FOR PRIORITIZING FACTORS AFFECTING VESSEL CREW SATISFACTION USING ANALYTIC HIERARCHY PROCESS	Gozde Kadioglu, Student- Istanbul Technical University; Umut Arıcan, Student; Cemil Ceylan, Assist. Prof.; Cigdem Kadaifci, Istanbul Teknik Universitesi, Turkey
A DECISION MODEL FOR SELECTION OF THE BEST AIRLINE COMPANY: A CASE OF LONDON-ISTANBUL ROUTE	Berk Kucukaltan, Trakya University, Edirne/Turkey; Ilker Topcu, Istanbul Teknik Universitesi, Turkey
MEASUREMENT OF THE IMPACT OF THE NEWS ON STOCK PRICES	Pedro Palominos, Department of Industrial Engineering, Universidad de Santiago de Chile; Luis Quezada, Department of Industrial Engineering, Universidad de Santiago de Chile; Cristian Mateluna, University of Santiago of Chile
KingFisher	2.3 Government Policy and Decision Making
AN EVOLUTIVE DESCRIPTIVE MAPPING VISUALISATION TOOL WITH THE INTEGRATED GAIA-AHP	Alessio Ishizaka, University of Portsmouth, U.K.; Sajid Siraj, Leeds University Business School; Phillipe Nemery, SAP BeLux
AN INTER-ORGANIZATIONAL FRAMEWORK FOR PUBLIC IS MERGE DECISIONS	Enrique Mu, Carlow University, U.S.; Howard A Stern, Carlow University, U.S.

DECISION MODEL TO WEIGHT INDICATORS FOR MONITORING RESPONSIBLE RESEARCH AND INNOVATION IN NATIONAL R&D SYSTEMS	Irene Monsonís-Payá, Polibienestar Research Institute. Universitat de Valencia; Monica Garcia-Melon, Universitat Politecnica de Valencia, Spain; Félix Lozano-Aguilar, Universitat Politecnica de Valencia
Redstar	**5.3 Industrial and Manufacturing Engineering**
EMPLOYABILITY ANALYSIS IN PROFESSIONAL EDUCATION	Camila A. M. Silveira, Sao Paulo State University; Valerio Salomon, Sao Paulo State University, Brazil
EMPLOYEE PERFORMANCE EVALUATION USING ANALYTIC HIERARCHY PROCESS (AHP) FOR CHEMVI LABORATORY SDN. BHD.	Rafikul Islam, International Islamic University Malaysia; Nagendran Periaiah, International Islamic University Malaysia
PREDICTION OF USER BEHAVIOUR ON THE BASIS OF KEY DETERMINANTS OF SUSTAINABILITY FOR CONSTRUCTION PRODUCTS WITH THE HELP OF THE ANALYTIC HIERARCHY PROCESS	Mariia Rochikashvili, TU Bergakademie Freiberg; Jan Clemens Bongaerts, TU Bergakademie Freiberg
FRIDAY 5:15 to 6:15 pm	
Campanula	**1.3 Multi-criteria Decision Analysis Methodology and Theory**

COMBINING PROMETHEE AND AHP: MATCHING THE MEANING OF WEIGHTS	Henk Broekhuizen, University of Twente; Karin Groothuis-Oudshoorn, University of Twente; Marjan Hummel, University of Twente, Dept. HTSR
LOCAL PROPERTIES OF SYNTHESES FOR CATEGORIZED AHP	Takafumi Mizuno, Meijo University, Japan; Eizo Kinoshita, Meijo University
WHAT IS THE APPROPRIATE SAMPLE SIZE TO RUN ANALYTIC HIERARCHY PROCESS IN A SURVEY-BASED RESEARCH?	Paolo Melillo, Second University of Naples; Leandro Pecchia, University of Warwick, UK
Great Western 2	**6.4 Business and Innovation Systems**
VISITOR FLOW OF CULTURALLY IMPORTANT AREAS: AN AHP PERCEPTION ON THE TRAIL SELECTION IN SRIPADA MOUNTAIN AREA OF SRI LANKA	Malinda Siriwardana, Graduate School of Life and Environmental Science
A CLOUD MIGRATION DECISION SUPPORT SYSTEM FOR SMES IN TAMIL NADU (INDIA) USING AHP	Berlin Mano Robert Wilson, Sheffield Hallam University; Babak Khazaei, Sheffield Hallam University; Laurence Hirsch, Sheffield Hallam University
DECISION MAKING ON E-ASSESSMENT CRITERIA IN RUBRICS	Blazenka Divjak, University of Zagreb, Croatia; Nina Begicevic Redep, University of Zagreb, Croatia

KingFisher	2.4 Government Policy and Decision Making
A NEW BUDGET ALLOCATION MODEL BASED ON EFFICIENCY ANALYSIS FOR PUBLIC R&D GRANT PROGRAMMES	Betül Cansu ÖZÇAKMAK, THE SCIENTIFIC AND TECHNOLOGICAL RESEARCH COUNCIL OF TURKEY; Metin Dağdeviren, Department of Industrial Engineering, Gazi University, Ankara, Turkey
ADRESSING UNCERTAINTY AND COMPATIBLITY IN AHP MODELING: PROJECT PORTAFOLIO SELECTTION FOR GEF MEXICO	Luis Antonio Bojórquez-Tapia, LANCIS UNAM, Mexico; Paola Antonio Gómez-Priego, Laboratorio Nacional de Ciencias de la Sostenibilidad; Lakshmi Antonio Charli-Joseph, Laboratorio Nacional de Ciencias de la Sostenibilidad
FACTORS AND THEIR INFLUENCE IN DEVELOPING FOOD COOPERATIVES	Anna Florek-Paszkowska (Greda), Jagiellonian University, Poland
Redstar	5.4 Industrial and Manufacturing Engineering
CRITICAL PROCESSES PRIORITIZATION IN A SANITARY COMPANY USING ANALYTIC HIERARCHY PROCESS	Claudio Javier Macuada, Universidad de Santiago de Chile; Francisca Jimena Fábrega, Universidad de La Serena; Astrid Maria Oddershede, usach, Chile
DETERMINING ENERGY INVESTMENT DECISION WITH AHP IN AFRICA BY USING GOVERNANCE AND ELECTRICAL CONSUMPTION	Omer Aladinli, Istanbul Technical University

COMPARATIVE ANALYSIS OF AHP AND FUZZY AHP IN SUPPLIER SELECTION PROBLEM	Ririn Diar Astanti, Department of Industrial Engineering, Universitas Atma Jaya, Indonesia; The Jin Ai, Department of Industrial Engineering, Universitas Atma Jaya Yogyakarta, Indonesia; Stephanie Eka Mbolla, Department of Industrial Engineering, Universitas Atma Jaya Yogyakarta

SATURDAY AUGUST 6 - BREAK OUT SESSIONS

SATURDAY 1:00 to 2:30 pm

Atrium	Poster Session 2
SCENARIOS OF TERRITORIAL TRANSFORMATION OF AN ITALIAN ALPINE AREA: THE PROVINCE OF BELLUNO	Giovanni Campeol, University IUAV of Venice; Sandra Carollo, Studio ALIA; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Nicola Masotto, University of Padua; Antonella Petrillo, University of Naples "Parthenope", Italy; Giuseppe Stellin, University of Padua, Italy
THE BIGGEST THREAT FACING MIDDLE EAST	Heba Adbulwasea Gogandy, King Abdul-Aziz University; Lamees Muhammad Alhashimi, King Abdulaziz University; Khadija Mughrbil, King Abdul-Aziz University; Asma M Bahurmoz, King Abdulaziz University, Saudi Arabia
EXOGENEITY TEST AND ITS APPLICATION IN ANALYSIS OF RELATIONSHIPS OF FORWARD AND SPOT EXCHANGE RATES	Josef Arlt, University of Economics Prague; Martin Mandel, University of Economics Prague; Markéta Arltová, University of Economics Prague
PRIORITIZING SERVICE QUALITY MEASUREMENT CRITERIA IN CHARTER BUS TRANSPORTATION SERVICES WITH AHP	Andrey Pelicer Tarichi, University Center of Araraquara -UNIARA; Leandro Cocato Fernandes, University Center of Araraquara - UNIARA; Claudio Luis Piratelli, University Center of Araraquara -

	UNIARA; Creusa Sayuri Tahara Amaral, University Center of Araraquara -UNIARA
MANAGEMENT OF CAPITAL INVESTMENT PROJECTS – USING AHP/ANP FOR THE PRIORITIZATION OF CRITICAL SUCCESS FACTORS	Constantin Schnupp, University of St. Gallen (CH)

SATURDAY 10:40 to 11:40 am

Campanula	1.4 Multi-criteria Decision Analysis Methodology and Theory
AHP GROUP DECISION MAKING AND CLUSTERING	Oliver Meixner, University of Natural Resources and Life Sciences Vienna; Rainer Haas, University of Natural Resources and Life Sciences Vienna; Siegfried Pöchtrager, University of Natural Resources and Life Sciences Vienna
A METHOD WITH FEEDBACK FOR AGGREGATION OF GROUP INCOMPLETE PAIR-WISE COMPARISONS USING SCALES WITH DIFFERENT NUMBERS OF GRADES	Vitaliy V. Tsyganok, Institute for Information Recording of National Academy of Sciences of Ukraine

MULTI-METHOD ANALYTICAL HIERARCHICAL TECHNOLOGY FOR GROUP MULTI-ATTRIBUTE CHOICE	Alexey Petrovsky, Institute for Systems Analysis, Federal Research Center "Informatics and Control", Russian Academy of Sciences
Great Western 2	**6.5 Business and Innovation Systems**
AN AHP APPLICATION TO WINE EVALUATION: RATING BASED ON THE CRITERIA FRAMEWORK OF THE METHOD ADOPTED BY BRAZILIAN SOMELIERS ASSOCIATION – ABS	Flavio Antonio Maia Pinto, COPPE UFRJ Production Engineering Program - Brazil; Getulio Marques, COPPE - UFRJ - Brazil; Antonio Carlos Morim, COPPE - UFRJ - Brazil
ANALYSIS OF ERP IMPLEMENTATION EFFECTIVENESS OF A PLANTATION COMPANY IN INDONESIA	Fauzan Azima, Universitas Indonesia; Ratih Dyah Kusumastuti, Universitas Indonesia
EVALUATION OF THE QUALITY OF LIFE IN THE CZECH ADMINISTRATIVE REGIONS	Josef Jablonsky, University of Economics, Czech Republic
KingFisher	**2.5 Government Policy and Decision Making**
AHP AND DECISION MAKING ON THE USE OF CULTURAL HERITAGE IN RURAL TOURISM DEVELOPMENT IN LATVIA	Baiba Rivza, Latvia University of Agriculture

AN APPLICATION OF AHP IN CLIMATE CHANGE MITIGATION WITH ACQUIRING RENEWABLE ENERGY TECHNOLOGIES IN NEPAL	Prabal Sapkota, Kathmandu University, Dhulikhel, Kavre, Nepal; Martina Pokharel, Freelancer
AN INTEGRATED MULTI-CRITERIA PLANNING MODEL FOR THE HYDROPOWER SURPLUS UTILIZATION IN PARAGUAY	Raúl Emilio Amarilla, Polytechnic Faculty, National University of Asuncion; Gerardo Alejandro Blanco, Polytechnic Faculty, National University of Asuncion; Aldo Martínez, Polytechnic Faculty, National University of Asuncion
Redstar **3.3 Healthcare Decision Making**	
EVALUATING THE RISK OF ADVERSE EVENTS IN HOSPITAL SECTOR THROUGH HYBRID MODEL AHP-DEMATEL-VIKOR METHODS	Miguel Angel Ortiz Barrios, Universidad de la Costa, Colombia; Antonella Petrillo, University of Naples "Parthenope", Italy; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Javier José Rua Muñoz, Department of Industrial Engineering, Universidad de la Costa CUC; Zulmeira Herrera Fontalvo, Department of Industrial Engineering, Universidad de la Costa CUC; Saimon Ojeda Gutierrez, Department of Industrial Engineering, Universidad de la Costa CUC
PRELIMINAR PRIORITIZATION OF CLINICAL VARIABLES OF THE RESPIRATORY SYSTEM OF NEONATAL PATIENTS USING THE ANALYTICAL HIERARCHY PROCESS.	Yury ESTEPA-AVELLANEDA, Student; Juan Miguel David BECERRA TOBAR, Assistant Research; Diana Patricia PEDRAZA ALFONSO, Pediatrician and Neonatologist; Luis Carlos MENDEZ CORDOBA, Associate professor; Jan BACCA RODRIGUEZ, Associate Professor

SHOULD HEALTHCARE PROVIDERS IN THE VA HEALTHCARE SYSTEM TELECOMMUTE?	Michelle Bergman, Carlow University; Brittany Miller, Carlow University; Vida Passero, Carlow University; Enrique Mu, Carlow University, U.S.

SATURDAY 12:00 to 1:00 pm	

Campanula	**1.5 Multi-criteria Decision Analysis Methodology and Theory**
BUILDING A VALIDATION FRAMEWORK FOR THE PRIORITY VECTOR CALCULATIONS OF A PAIRWISE COMPARISON MATRIX IN AHP/ANP	Elena Rokou, Creative Decisions Foundation
PERFORMANCE OF COMPATIBILITY INDICES FOR HIGH N VECTORS	José Leonardo da Silveira Guimarães, Regional University of Cariri; Valerio Salomon, Sao Paulo State University, Brazil
CONSISTENCY & COMPATIBILITY (TWO SIDES OF THE SAME COIN)	Claudio Garuti, Fulcrum Ingenieria, Chile

Great Western 1	**Invited Speakers**	
ANALYTIC HIERARCHY PROCESS TO SELECT THE SURGICAL APPROACH IN HERNIA REPAIR: LAPAROSCOPIC VERSUS OPEN SURGERY HERNIA REPAIR	Sajeevie Pinnaduwe Hewa, University of Warwick; Umberto Bracale, University Federico II of Naples; Leandro Pecchia, University of Warwick, UK Invited Speaker: Leandro Pecchia, University of Warwick, UK	

THE SUPPLIER SELECTION PROBLEM: THE EVOLUTION OF A QUINTESSENTIAL MULTI-CRITERIA DECISION MAKING PROBLEM	Invited Speaker: Andrea Genovese, University of Sheffield, UK
Great Western 2	**6.6 Business and Innovation Systems**
ESTIMATING SUBSCRIBERS` PERCEPTION OF BRAND EQUITY ON PURCHASE DECISION OF NIGERIAN MOBILE TELECOMMUNICATION SERVICES: AN ANALYTICAL HIERARCHY PROCESS APPROACH	Sulaimon Olanrewaju Adebiyi, Business Administration Department, Fountain University, Osogbo. Nigeria; Emmanuel Olateju Oyatoye, University of Lagos, Nigeria; Bilqis Bolanle Amole, Department of Business Administration, University of Lagos, Nigeria
SUSTAINABLE INNOVATION MULTICRITERIA INDEX (SIMI) FOR ASSESSMENT OF BIOTECHNOLOGY RESEARCH	Rafael Lima Medeiros, Federal University of Amazonas; Ranniery Mazzilly, University of Minho; Nelson Kuwahara, Federal University of Amazonas; Niomar Lins Pimenta, Federal University of Amazonas
THE PRIORITIES OF SUPPLY REQUIREMENTS FOR E-LEARNING USING THE ANALYTIC HIERARCHY PROCESS	Min-Suk Yoon, Chonnam National University, Republic of Korea; Joohyun Park, Chonnam National University; Xuting Li, chonnam national university; Jun-Suk Lee, chonnam national university
KingFisher	**2.6 Government Policy and Decision Making**

USING AHP AND DEA IN COMPARATIVE STRATEGIC ANALYSIS OF POLISH REGIONS	Jacek Strojny, Rzeszow University of Technology, Poland
MENTAL MODEL AND NETWORKS-BASED METHODOLOGIES FOR THE DEVELOPMENT OF AHP/ANP STRUCTURES	Luis Antonio Bojórquez-Tapia, LANCIS UNAM, Mexico; Bertha Hernández-Aguilar, LANCIS; Alejandra Martinez, LANCIS; J. Mario Siqueiros-García, IIMAS-UNAM
SELECTION PROCESS OF MUNICIPALITIES FOR THE IMPLEMENTATION OF SENAI OPERATING UNITS USING MULTICRITERIA DECISION ANALYSIS	Giovani Gujansky, SENAI/ES; Mischel Carmen Neyra Belderrain, Instituto Tecnologico de Aeronautica
Redstar	**5.5 Industrial and Manufacturing Engineering**
IMPROVEMENT OF OBJECT ORIENTED DESIGN QUALITY MEASUREMENT USING FUZZY AHP	Petrus Mursanto, Universitas Indonesia, Indonesia
INTEGRATING ECOSYSTEM SERVICES INTO INDUSTRIAL LOCATION STUDIES: A FUZZY HIERARCHIC APPROACH	Guilherme Weber Martins, UFRJ; Carlos Alberto Nunes Cosenza, UFRJ; Getulio Marques, COPPE - UFRJ - Brazil
INTEGRATING SUSTAINABILITY AND MANUFACTURING STRATEGY IN A UNIFIED FRAMEWORK	Eppie Estanislao Clark, De La Salle University

SATURDAY 1:00 to 2:30 pm	
Atrium	**Poster Session 2**
SCENARIOS OF TERRITORIAL TRANSFORMATION OF AN ITALIAN ALPINE AREA: THE PROVINCE OF BELLUNO	Giovanni Campeol, University IUAV of Venice; Sandra Carollo, Studio ALIA; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Nicola Masotto, University of Padua; Antonella Petrillo, University of Naples "Parthenope", Italy; Giuseppe Stellin, University of Padua, Italy
THE BIGGEST THREAT FACING MIDDLE EAST	Heba Adbulwasea Gogandy, King Abdul-Aziz University; Lamees Muhammad Alhashimi, King Abdulaziz University; Khadija Mughrbil, King Abdul-Aziz University; Asma M Bahurmoz, King Abdulaziz University, Saudi Arabia
EXOGENEITY TEST AND ITS APPLICATION IN ANALYSIS OF RELATIONSHIPS OF FORWARD AND SPOT EXCHANGE RATES	Josef Arlt, University of Economics Prague; Martin Mandel, University of Economics Prague; Markéta Arltová, University of Economics Prague
PRIORITIZING SERVICE QUALITY MEASUREMENT CRITERIA IN CHARTER BUS TRANSPORTATION SERVICES WITH AHP	Andrey Pelicer Tarichi, University Center of Araraquara -UNIARA; Leandro Cocato Fernandes, University Center of Araraquara -UNIARA; Claudio Luis Piratelli, University Center of Araraquara -UNIARA; Creusa Sayuri Tahara Amaral, University Center of Araraquara -UNIARA

MANAGEMENT OF CAPITAL INVESTMENT PROJECTS – USING AHP/ANP FOR THE PRIORITIZATION OF CRITICAL SUCCESS FACTORS	Constantin Schnupp, University of St. Gallen (CH)

SATURDAY 4:00 to 5:00 pm	
Campanula	**1.6 Multi-criteria Decision Analysis Methodology and Theory**
A MEASUREMENT OF AGREEMENT AMONG JUDGES FROM DIFFERENT BACKGROUNDS IN ANALYTIC HIERARCHY PROCESS	Indrani Basak, Penn State Altoona
VOTING THEORY AND PAIRWISE COMPARISON MATRICES	Takafumi Mizuno, Meijo University, Japan; Kouichi Taji, Nagoya University
AHP METHOD OF DETERMINATION OF RELATIVE WEIGHTS FOR JUDGED ITEMS AND JUDGES IN A JUDGEMENT PROCESS	Alexandre Souza Girão, Sebastião Girão Rocha and Zaide Souza Girão
Great Western 2	**6.7 Business and Innovation Systems**
APPLICATION OF THE AHP IN ANALYSING DECISION MAKING PROCESS IN PROJECTS: CASE STUDY OF A MAJOR PROJECT DECISION	Ramesh Vahidi, Business School, Southampton University

ANALYSIS OF IMPROVEMENT ELEMENTS OF WALKING ENVIRONMENT ON KOREA TRADITIONAL MARKETS USING AHP	Kumho Chung, Department of Architecture, Chonnam National University, South Korea; Min-Suk Yoon, Chonnam National University, Republic of Korea
ESTABLISHING A MULTI-CRITERIA EVALUATION STRUCTURE FOR DEVELOPMENT TOURISM STRATEGIES: THE CASE OF CARTAGENA	Hannia Karime González-Urango, Universitat Politecnica de Valencia; Monica Garcia-Melon, Universitat Politecnica de Valencia, Spain
KingFisher	**4.1 Applications in Civil Engineering and Urban Management**
RATING THE ACTION PROGRAMMES FOR FLOOD PREVENTION WITH AHP-ANP MODELS: AN EVALUATION OF COLLECTIVE PREVENTION EFFORT	Flora GUILLIER, University od eastern Paris
TSUNAMI EVACUATION SIMULATION WITH MULTI-AGENTS AND DECISION MAKING ON A COUNTERMEASURE WITH AHP	Kazuhiro Kohara, Chiba Institute of Technology, Japan; Takuya Sugiyama, Chiba Institute of Technology
A SURVEY OF AHP AND ANP APPLICATIONS IN CIVIL ENGINEERING AND URBAN MANAGEMENT	Grzegorz Ginda, AGH University of Science and Technology, Poland; Miroslaw Dytczak, AGH University of Science and Technology, Poland
Redstar	**5.6 Industrial and Manufacturing Engineering**

APPLYING AN ANALYTIC HIERARCHY PROCESS TO CREATE A NEW MEASURE OF FUEL POVERTY	Robert Marchand, University of Sheffield; Lenny Koh, University of Sheffield; Andrea Genovese, University of Sheffield; Alan Brennan, University of Sheffield
CLARITY OF VIEW: AN AHP BASED EVALUATION FRAMEWORK FOR DRIVER AWARENESS SYSTEMS IN HEAVY VEHICLES	Dee Wood Kivett, Clemson University
A PERFORMANCE MEASUREMENT MODEL FOR MANUFACTURING COMPANIES TO DETERMINE THEIR STRENGTHS AND WEAKNESSES IN CRITICAL ACTIVITIES	Mustafa Yurdakul, Gazi University; Yusuf Tansel Ic, Baskent University

SATURDAY 5:15 to 6:15 pm	
Campanula	**1.7 Multi-criteria Decision Analysis Methodology and Theory**
EDUCATIONAL PROJECTS AS INTAGIBLES' RESOURCE ALLOCATION: AN AHP APPROACH	Andrei Răduțu, Bucharest University of Economic Studies; Adriana Agapie, Bucharest University of Economic Studies, Romania
THE IDENTIFCATION OF ADEQUATE CONTROL STRUCTURE FOR AHP AND ANP	Grzegorz Ginda, AGH University of Science and Technology, Poland; Miroslaw Dytczak, AGH University of Science and

	Technology, Poland; Barbara Jastrząbek, University of Bielsko-Biala, Faculty of Materials, Civil and Environmental Engineering
A NEW INTIUTIONISTIC INTEGRATED APROACH WITH FUZZY AHP AND FUZZY MOORA	Kumru Didem Atalay, Baskent University; Gülin Feryal Can, Baskent University; Betül Cansu Özçakmak, TÜBİTAK
Great Western 2	**6.8 - Business and Innovation Systems**
EVALUATION OF CUSTOMER RELATIONSHIP MANAGEMENT (CRM) SYSTEMS USING AN AHP APPROACH	Shannon Agredo, Carlow University; Catherine Vella, Carlow University; Enrique Mu, Carlow University, U.S.
IDENTIFYING R&D SUCCESS PARTNERSHIP FOR NEPALESE UNIVERSITIES USING ANALYTIC HIERARCHY PROCESS	Madhav Prasad Pandey, Kathmandu University, Dhulikhel, Kavre, Nepal; Prabal Sapkota, Kathmandu University, Dhulikhel, Kavre, Nepal
MARKETING MIX STRATEGY MODEL FOR SMALL BUSINESSES IN KERALA USING ANP	Salwa CH, Research Scholar; T RADHA RAMANAN, Assistant Professor
KingFisher	**4.2 Applications in Civil Engineering and Urban Management**

ANALYTIC HIERARCHY PROCESS AND CHOQUET INTEGRAL COMBINED WITHIN NON ADDITITIVE ROBUST ORDINAL REGRESSION FOR THE SELECTION OF SOCIAL HOUSING INITIATIVES	Francesca Abastante, Politecnico of Torino; Salvatore Corrente, University of Catania; Salvatore Greco, University of Catania; Alessio Ishizaka, University of Portsmouth, U.K.; Isabella Lami, Politecnico of Torino
INTEGRATING COLLABORATIVE PROBLEM STRUCTURING TECHNIQUES AND THE ANALYTIC HIERARCHY PROCESS: THE CASE OF THE NEW REGIONAL TRANSPORTATION PLAN FOR 2050 IN THE PIEDMONT REGION	Maurizio Arnone, SiTI; Cristiana Botta, SiTI; Valentina Ferretti, London School of Economics and Political Science; Marco Valle, SiTI
ENVIRONMENTAL IMPACT ASSESSMENT FOR TALL BUILDINGS: THE APPLICATION OF THE ANP FOR A NEW LANDMARK IN THE CITY OF TURIN (ITALY)	Valentina Ferretti, London School of Economics and Political Science; Giulio Mondini, SiTI
Redstar	**5.7 Industrial and Manufacturing Engineering**
RANKING OF ENTERPRISES WITH REGARD TO INDUSTRIAL MATURITY LEVEL USING AHP AND TOPSIS	Zoran Babic, University of Split, Faculty of Economics; Ivica Veza, University of Split, Faculty of Electrical-, Mechanical Engineering and naval Architecture; Ivan Pavic, University of Split, Faculty of Economics
SIMULATION OF AHP METHOD	Abel Zacarias, Universidade Mandume Ya Ndemufayo - Angola

THE INFLUENCE OF TECHNOLOGY AND RISK MANAGEMENT IN THE STRATEGIC ALIGNMENT OF A PORT SYSTEM	JUAN M. SEPULVEDA, UNIVERSITY OF SANTIAGO OF CHILE; CLAUDIA A. DURAN, UNIVERSITY OF SANTIAGO OF CHILE

SUNDAY AUGUST 7 - BREAK OUT SESSIONS	
SUNDAY 10:40 to 11:40 am	
Campanula	**1.8 Multi-criteria Decision Analysis Methodology and Theory**
HOW TO WRITE A CONTRACT WITH THE AHP	Luis G Vargas, University of Pittsburgh, U.S.; Ami Arbel, School of Engineering at Tel Aviv University, Israel
WEIGHTED AVERAGE VS TOPSIS: A COMPARISON OF AGGREGATION METHODOLOGIES FOR AHP	Giuseppe Bruno, University of Naples "Federico II"; Francesco Ciardiello, University of Sheffield; Andrea Genovese, University of Sheffield; Carmela Piccolo, University of Naples "Federico II"
NEW PRIORITY CALCULATIONS	William Adams, Decision Lens Incorporated, U.S.
Great Western 2	**6.9 Business and Innovation Systems**
MEASURING SCHOLARSHIP IDENTITY CONGRUENCE IN HIGHER EDUCATION INSTITUTIONS: A MULTICRITERIA APPROACH	Milagros Pereyra, University of Pittsburgh, U.S.; Enrique Mu, Carlow University, U.S.
PRIORITIZATION OF PERFORMANCE MEASURES USING AHP	Revaz George Vachnadze, Free University of Tbilisi

RELEVANCE OF STRATEGIC MANAGEMENT IN ICT BASED SMALL AND MEDIUM ENTERPRISES	Ananta Man Singh, Institute of Engineering, Pulchowk College
KingFisher	**2.7 Government Policy and Decision Making**
USING AHP TO DETERMINE MOTIVATIONAL FACTORS DRIVING VOLUNTEERISM IN SPORTS: NIGERIA OLYMPIC SPORT FEDERATIONS EXPERIENCE	Sikuade Oladimeji Jagun, Sol Simon Investments Ltd, Nigeria; Bolajoko Nkemdinim Dixon-Ogbechi, University of Lagos, Nigeria; Elizabeth Marie Haran, Salem State University, U.S.
AN ASSESSMENT MODEL FOR ENTERPRISE ARCHITECTURE IMPLEMENTATION IN PUBLIC SECTOR ORGANISATION	NUR AZALIAH A. BAKAR, UNIVERSITI TEKNOLOGI MALAYSIA; HARIHODIN SELAMAT, UNIVERSITI TEKNOLOGI MALAYSIA
EMERGING TRENDS IN REAL ESTATE MARKETS: PROPOSAL OF A MULTI CRITERIA MODEL OF INVESTMENTS RISKINESS	Chiara D'Alpaos, DICEA - University of Padova, Italy; Rubina Canesi, DICEA, University of Padova, Italy; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Antonella Petrillo, University of Naples "Parthenope", Italy
Redstar	**5.8 Industrial and Manufacturing Engineering**
ASSESSMENT OF SUPPLY CHAIN MANAGEMENT MATURITY	Claudemir Leif Tramarico, Sao Paulo State University (UNESP), Brazil; Valerio Salomon, Sao Paulo State University, Brazil;

	Fernando Augusto Silva Marins, UNESP - Sao Paulo State University, Brazil
MULTI-CRITERIA CLASSIFICATION OF SPARE PARTS	Henrique Kriguer, Sao Paulo State University; Valerio Salomon, Sao Paulo State University, Brazil
A COMPARISON STUDY OF ABC INVENTORY CLASSIFICATION USING MCDM METHODS	ERGUN ERASLAN, YILDIRIM BEYAZIT UNIVERSITY; Yusuf Tansel Ic, Baskent University

SUNDAY 12:00 to 1:00 pm	
Campanula	**1.9 Multi-criteria Decision Analysis Methodology and Theory**
DECISION SUPPORT ARSENAL USAGE FOR STRATEGIC PLANNING	Sergii Kadenko, Institute for Information Recording of the National Academy of Sciences of Ukraine
EFFICIENCY	Sándor Bozóki, Institute for Computer Science and Control, Hungarian Academy of Sciences
EVALUATION OF CONSUMER BUYING BEHAVIOUR FOR SPEFIC FOOD COMMODITY USING FUZZY AHP APPROACH	Gokulananda Patel, Birla Institute of Management Technology
Great Western 1	**Invited Speakers**
THE USE OF MULTI-CRITERIA DECISION ANALYSIS IN EARLY HEALTH TECHNOLOGY ASSESSMENT	Invited Speaker: Marjan Hummel, University of Twente, Dept. HTSR
AHP AND DATAMINING	Invited Speaker: Paolo Melillo, Second University of Naples
Great Western 2	**6.10 Business and Innovation Systems**

SELECTION OF SUSTAINABLE ENERGY SYSTEMS FOR NEPAL USING ANALYTIC HIERARCHY PROCESS	Prabal Sapkota, Kathmandu University, Dhulikhel, Kavre, Nepal; Martina Pokharel, Freelancer; Madhav Prasad Pandey, Kathmandu University, Dhulikhel, Kavre, Nepal
SUSTANABILITY MARKETING MIX FOR FOREST PRODUCTS VALUE CHAINS	Omid Hosseinzadeh, Assistant Professor; Marzieh Hajjarian, Assistant Professor/Natural Resources/Urmia University; Reza Abdi, Professor/Bradford University
THE EVALUATION OF PREFERENCES OF CONSUMERS FOR COFFEE SHOP CHAINS IN TURKEY	Gozde Kadioglu, Student- Istanbul Technical University; Ilker Topcu, Istanbul Teknik Universitesi, Turkey

KingFisher	**7.1 Advances in Operational Research**
VULNERABILITY ASSESSMENT IN MEGALOPOLIS: ANP-MAS MODELING APPROACH FOR MEXICO CITY	Luis Antonio Bojórquez-Tapia, LANCIS UNAM, Mexico; Hallie Eakin, School of Sustainability, Arizona State University; Marco Jansen, School of Sustainability, Arizona State University; Andrés Baeza, School of Sustainability, Arizona State University
THE METHOD OF TIME GRANULARITY DETERMINATION ON TIME SERIES BASED ON STRUCTURAL SIMILARITY MEASURE ALGORITHM	Gao Xuedong, Donlinks School of Economics and Management University of Science and Technology; Chen Hailan, Donlinks School of Economics and Management University of Science and Technology Beijing

THE NEW STAGE OF DATA MINING RESEARCH : VARIABLE METRIC DATA MINING	Ai Wang, Donglinks School of Economics and Management, University of Science and Technology Beijing; Xuedong Gao, Donglinks School of Economics and Management,　University of Science and Technology Beijing
Redstar	**5.9 Industrial and Manufacturing Engineering**
ANALYTIC HIERARCHY PROCESS BEST APPROACH IN SEQUENCING OF ORDINARY DISTILLATION COLUMNS	Omar Jair Purata-Sifuentes, Universidad de Guanajuato
SELECTION OF PROJECTS TO IMPLEMENT A MANUFACTURING STRATEGY	Luis Quezada, Department of Industrial Engineering, Universidad de Santiago de Chile; Maria Dolores Gracia, Faculty of Engineering, Universidad Autonoma de Tamaulipas; Pedro Palominos, Department of Industrial Engineering, Universidad de Santiago de Chile; Astrid Maria Oddershede, usach, Chile; Guillermo Fuentes, Universidad de Santiago de Chile
A CRITICAL COMPARISON OF MULTI-CRITERIA METHODOLOGIES FOR SUPPLIER SELECTION	Giuseppe Bruno, University of Naples "Federico II"; Francesco Ciardiello, University of Sheffield; Emilio Esposito, University of Naples "Federico II"; Andrea Genovese, University of Sheffield; Carmela Piccolo, University of Naples "Federico II"

PROGRAM SCHEDULE WITH ABSTRACTS

THURSDAY AUGUST 4

REGISTRATION

12:00 to 3:00 pm
Room: Atrium

USER-NEED ELICITATION VIA AHP: STUDY DESIGN AND PILOTING
Workshop
1:00 to 2:00 pm
Room: Great Western 2

Several papers and books have been published that discuss different aspects of the AHP/ANP method. Much less has been published about designing and pilot-testing AHP and ANP user-need elicitation models. This workshop aims to fill this gap by providing a guide to the organizers of focus groups interested in using the AHP/ANP to prioritise user needs. Several studies that have used AHP and ANP for user-need elicitation about design/adoption of new healthcare technologies will be presented. The elicitor, the AHP expert in collaboration with one or two domain experts about the problem being investigated, will help define the main goal and identify the main needs. Through a systematic search of the literature, or via focus groups, other relevant needs are identified and organized in meaningful categories, creating a hierarchy of needs. According to the hierarchy, a series of questionnaires are developed, using a layout familiar to the domain experts. The hierarchy and questionnaires are then run through a pilot study with a limited group of domain experts in order to: identify needs that did not emerge from the literature review; review the classification of needs; improve the questionnaires to avoid ambiguities or misleading words.

Presenter: Leandro Pecchia, University of Warwick, UK

ANP SENSITIVITY WORKSHOP ISAHP 2016

Workshop
2:00 to 3:00 pm
Room: Great Western 2

Knowing the sensitivity of an ANP model to the importance of a given node opens vistas for new insights and analyses of models. Dr. William Adams developed and patented several calculations of node sensitivity based upon the idea of ANP Row Sensitivity. These ideas were implemented initially in SuperDecisions for research purposes. Those methods, available in SuperDecisions can be used to answer questions like: In order to change public opinion on a critical issue, what is the key concept we should make more or less important in the public's mind, If the given criterion/node is the most important in a network how does that effect resultant alternative priorities, e.g., if environmental impact is the most important aspect, what course should we pursue politically, If we have users do a shortcut set of votes in a model, which nodes should we focus on for more detailed voting, and which nodes have essentially no impact, thereby reducing the burden on the voter requiring fewer votes to get essentially the same answer? How do I find out which nodes affect the ranking of the alternatives, and which have no impact on ranking at all? In this workshop we demonstrate how to use the existing functionality in SuperDecisions to perform these calculations. In addition, we show how to formulate interesting questions that ANP Sensitivity calculations can address.
Presenter: William Adams, Decision Lens Inc

COFFEE BREAK

3:00 to 3:30 pm
Room: Atrium

OVERVIEW OF THE NEW SUPER DECISIONS SOFTWARE (V3.0) FOR THE ANALYTIC HIERARCHY PROCESS (AHP) AND ANALYTIC NETWORK PROCESS

Workshop
3:30 to 4:30 pm
Room: Great Western 2

The SuperDecisions software can be used to create both hierarchical (AHP) and network (ANP) models as well as complex multi-level models of both types. In this workshop we will show the new version of SuperDecisions software (v3.0) and concentrate on showing how to use the Ratings Model to rate alternatives one-by-one on standards for the criteria instead of pairwise comparing them, thus shortening the judgment process a good deal. We will discuss when it is appropriate to use comparisons and when to use ratings. We will also show how to structure and work with multilevel BOCR (benefits, opportunities, costs and risks) models. Some validation examples will be given that reveal the magic of the supermatrix data structure for hierarchies and networks. Bring your laptop and we will install a 60 day trial version of the software for you to try out.
Presenter: Rozann W. Saaty, Creative Decisions Foundation, U.S.

SIMPLIFYING AHP TO MAKE IT ACCESSIBLE TO YOUTH

Workshop
4:30 to 5:30 pm
Room: Great Western 2

In Montessori classes in particular, and other primary/secondary school environments children are given the responsibility of making choices. A few examples are: where a class field trip may go, who is responsible for cleaning what areas of the classroom, or what the class pet should be. AHP theory could be helpful for children in these types of situations; however, the overhead of learning all of the theory and tools is a daunting task. We have created an open source set of tools to aid youth in using AHP theory for such tasks. These include simplified questionnaire templates, software for the analysis and visualization of their results, the

ability to break down opinions by demographic (what do girls versus boys think), tutorials, etc. In this workshop we will cover the tools and techniques developed by Dr. Bill Adams, his son Will Adams, and Devin Tamayo. In addition, we will cover the task of simplifying a difficult question into a simpler, but still useful, question that can be analyzed with this method. This method has already been used by a 12-year-old to solicit votes from his class of students aged 6-12 with very promising results (for instance, all participants were easily able to fill out the questionnaire).
Presenter: William Adams, Decision Lens Inc

WELCOME RECEPTION

Reception
6:00 to 8:00 pm
Room: Atrium

FRIDAY AUGUST 5

REGISTRATION

9:00 am to 3:00 pm
Room: Atrium

OPENING CEREMONY

Plenary Session
9:00 to 10:00 am
Room: Great Western 1

Speaker: Thomas L. Saaty, University of Pittsburgh, U.S.

COFFEE BREAK
10:00 to 10:40 am
Room: Atrium

3.1 HEALTHCARE DECISION MAKING

10:40 to 11:40 am
Room: Campanula

INTEGRATING AHP INTO EUNETHTA CORE MODEL: THE DECISION-ORIENTED HEALTH TECHNOLOGY ASSESSMENT (DOHTA) METHOD

Matteo Ritrovato, Bambino Gesù Children's Hospital; Francesco Cosimo Faggiano, Bambino Gesù Children's Hospital; Giorgia Tedesco, Bambino Gesù Children's Hospital; Martina Andellini, Bambino Gesù Children's Hospital; Pietro Derrico, Bambino Gesù Children's Hospital
Abstract

Health technology assessment (HTA) refers to the systematic evaluation of properties, effects, and/or impacts of health technology. It is a multidisciplinary process to evaluate the social, economic, organizational and ethical issues of a health intervention or health technology. The main

purpose of conducting an assessment is to inform a policy decision making. Indeed, HTA is a multidimensional and multidisciplinary assessment process, aimed at supporting decisions pertaining to the allocation of resources. The EUnetHTA Core Model® is a well-known and commonly used tool for structuring the evaluation of innovative health technologies. It is based on assessment elements that describe the technology or the consequences of its use by supplying the information needed to decide on the use or non-use of any selected technology In order to empower decision makers to choose more knowingly between the different alternatives being considered, offering them a more precise and more structured output as well as contextualized evidence for a specific technology, we developed a standardized methodological approach that integrates Analytic Hierarchy Process (AHP) with the EuNetHTA Core Model®, that we called Decision-Oriented HTA (doHTA). Compared to the Core Model®, doHTA supplies a more timely as well as contextualized evidence for a specific technology, making it possible to obtain data which are more relevant and easier to interpret, and therefore more useful for decision makers to make investment choices with greater awareness. DoHTA has been devised mainly to address decision-making issues at hospital levels (i.e. pertaining the decision about implementing or not-implementing a specific, already marketed, health technology). However, its mathematical framework offers the possibility to be used in different settings (R&D, pricing and reimbursement, etc.) and in combination with other analytical methods (such as Markov models, MonteCarlo simulation, Deterministic Sensitivity Analysis).

DECISION-ORIENTED HTA FOR COMPARING THREE-DIMENSIONAL (3D)/TWO-DIMENSIONAL (2D) LAPAROSCOPIC DISPLAY SYSTEMS IN A VARIETY OF PEDIATRIC SURGICAL PROCEDURES

Martina Andellini, Bambino Gesù Children's Hospital; Giorgia Tedesco, Bambino Gesù Children's Hospital; Francesco Cosimo Faggiano, Bambino Gesù Children's Hospital; Pietro Derrico, Bambino Gesù Children's Hospital; Matteo Ritrovato, Bambino Gesù Children's Hospital
Abstract

Laparoscopic procedures have become increasingly popular. The use of 3-dimensional (3D) vision might aid in performing laparoscopic procedures. The aim of the study is to show the main results of applying

the "Decision-oriented Health Technology Assessment" (doHTA) method for the assessment of a 3D laparoscopic system compared to a conventional two-dimensional (2D) laparoscopic system to support the decision-making process about the choice to adopt the new technology in the hospital. DoHTA is a new implementation of the EUnetHTA Core Model®, which integrates the Multi-Criteria Decision Analysis (MCDA) using the Analytic Hierarchy Process (AHP). A decision tree covering all the relevant assessment aspects of 3D laparoscopic systems has been derived and weighted by means of pairwise comparisons. Subsequently, another pairwise comparison list was set up to compare both alternative technologies with respect to every lowest indicator. DoHTA results have quantitatively shown how a 3D laparoscopic system appears to be as safe as a 2D laparoscopic system in many surgical procedures and how it seems to offer many benefits for surgeons, such as reduced eyestrain, headaches, or other side effects than 2D vision. A 3D system is also suitable in reducing the mean error rate, also thanks to the stereoscopic depth perception that is lost in 2D vision. From a technical perspective, the analysis has indicated the reduction in median instrument path length, an enhancement of median motion smoothness, and the decrease in grasper frequency with the 3D display. However, the comparative cost-analysis has pointed out that the 3D procedure cost was slightly higher that its comparator. Based on the appreciation of such results, especially taking into account the positive technical and clinical features, we conclude that a 3D system may be a good alternative to a 2D system. Indeed, the doHTA results have led to a confident decision to implement 3D laparoscopic system in the hospital.

ASSESSMENT OF ROBOT-ASSISTED SURGERY IN A CHILDREN'S HOSPITAL BY APPLYING THE "DOHTA" METHOD

Giorgia Tedesco, Bambino Gesù Children's Hospital; Martina Andellini, Bambino Gesù Children's Hospital; Francesco Cosimo Faggiano, Bambino Gesù Children's Hospital; Pietro Derrico, Bambino Gesù Children's Hospital; Matteo Ritrovato, Bambino Gesù Children's Hospital

Abstract

Robotic surgery (RS) has been proposed as a minimally invasive surgical technique with advantages for both surgeons and patients, but it is concurrently associated with high costs (set up, use and maintenance). This paper presents the results of the application of the Decision-

Oriented Health Technology Assessment (doHTA) method for the assessment of a robotic surgical system, compared with laparoscopic and open surgeries (LS and OS), in the hypothesis of its implementation within the hospital. In particular, the economic sustainability of robotic surgery has been researched, its impact on the hospital budget being foreseen. DoHTA is a new implementation of the EUnetHTA Core Model®, which integrates the Multi-Criteria Decision Analysis (MCDA) using the Analytic Hierarchy Process (AHP).To develop a comprehensive and quantitative assessment of the RS, the doHTA analysis has been conducted, integrating scientific literature evidence with expert's judgments and data from context specific hospital management. The HTA report took into consideration all the aspects and recommendations about the benefits and disadvantages of robotic surgery compared with its alternative technologies. While RS offers surgeons better precision and articulation of instruments and a three-dimensional visualization, nevertheless, it is associated with high fixed costs, and in our context, it would have required many technical and structural modifications of the operating rooms, as well as having a strong impact on hospital budget and organization. Based on our results, the estimated performances of RS have turned out to be comparable with LS with respect to safety and clinical effectiveness, but about six times and three times worse in terms of economic and organizational performance, respectively. Accordingly, the RS ranked 3rd in the final ranking. The sensitivity analysis showed that the final ranking is sufficiently robust to affirm that the adoption of RS is infeasible in our hospital.

Session Chair: Matteo Ritrovato, Bambino Gesù Children's Hospital

6.1 BUSINESS AND INNOVATION SYSTEMS

10:40 to 11:40 am
Room: Great Western 2

SYSTEMATIC DECISION SUPPORT IN STRATEGY IMPLEMENTATION – A PROCESS FRAMEWORK AND APPLICATION OF A-CUT FUZZY ANP

Ludwig Sedlmeier, University of St. Gallen; Teresa Christmann-Schwaab, University of St. Gallen; Constantin Schnupp, University of St. Gallen (CH);

Klaus Möller, University of St. Gallen
Abstract

In order to establish competitive advantages and facilitate long-term success it is of utmost importance for companies to embark on the right strategy. Any promising strategy can only succeed if it is implemented appropriately. During strategy implementation corporate management is facing several obstacles. There is a lack of guidelines and frameworks supporting strategy implementation to overcome these obstacles. Therefore, the objective of this paper is to develop a process framework for systematic decision support in strategy implementation based on the α-cut fuzzy Analytic Network Process (ANP) approach. By conducting a case study, we demonstrate the suitability and practicability of the process framework to support management during selecting a supplier in line with the company's strategic goals.

THE ANALYTIC NETWORK PROCESS IN MODELING AND COORDINATION OF DYNAMIC SUPPLY NETWORKS

Petr Fiala, University of Economics, Czech Republic
Abstract

Supply chain management is more and more affected by network and dynamic business environment. Inefficiencies exist in supply network behavior. Coordination and cooperation can significantly improve the efficiency of supply networks. The Analytic Network Process (ANP) approach is appropriate for modeling network environment. The proposed version of dynamic ANP is able to model and analyze the supply dynamics. Dynamic ANP is a hybrid procedure that combines the benefits of long-term forecasting of pairwise comparison functions and short-term weight predictions using exponential smoothing compositional data. Analysis and modeling of dynamic supply networks goes through the following phases: designing, managing, performance measurement and improvement. Important features of this environment are established in the proposed approach, which can be a powerful instrument for modeling and coordination of dynamic supply networks.

USING AHP IN QFD – THE IMPACT OF THE NEW ISO 16355 STANDARD

Thomas Michael Fehlmann, Euro Project Office AG; Glenn Mazur, QFD

Institute, International Council for QFD, University of Michigan
Abstract

Traditional Quality Function Deployment (QFD) uses weights – percentages of a total – to describe priorities for customer's needs and technical solution approaches. Since AHP works with profiles – vectors of unit length one – it is possible to add, subtract and compare profiles, while weights yield wrong results when added, subtracted or com-pared. When using AHP for profiling customer's needs for use with QFD, this is an incompatibility that might lead to failures. The new ISO standard 16335 introduces ratio scales and profiles in QFD. Moreover, the method proposed by Saaty to calculate priority profiles in AHP is also applicable to modern QFD. The new ISO 16355 suggests ratio scales in QFD matrices instead of the traditional ordinal correlation strength indicators. AHP is used in many steps in QFD, but this paper will focus primarily on the House of Quality matrix.

Session Chair: Thomas Michael Fehlmann, Euro Project Office AG

2.1 GOVERNMENT POLICY AND DECISION MAKING

10:40 to 11:40 am
Room: KingFisher

ANP MODEL FOR ASSESSING SOCIO-ENVIRONMENTAL VULNERABILITY OF A RARAMURI COMMUNITY IN MEXICO

Luis Antonio Bojórquez-Tapia, LANCIS UNAM, Mexico; Daniela Antonio Pedroza, Laboratorio Nacional de Ciencias de la Sostenibilidad
Abstract

The ANP model developed in response to a federal court requesting an assessment of the socio-ecological impacts caused by the construction of an airport on a Raramurí indigenous community in Mexico is presented. The most challenging issue in ascertaining impacts was the consideration of cultural and spiritual aspects of the community´s way of living. Accordingly, the ANP model was based upon the notion of 'sustainable livelihoods' of rural communities. Results provided accurate estimates of monetary costs of foreseeable compensation actions to be considered in the ensuing settlement negotiations.

ASSESSING THE RESPONSIBILITY TOWARDS CLIMATE CHANGE OF RESEARCH PROJECTS BY MEANS OF ANALYTIC HIERARCHY PROCESS

Tomas Gomez-Navarro, Universitat Politècnica de València; Iván Ligardo-Herrera, Universitat Politècnica de València

Abstract

In this paper, we aim at modeling how to assess the responsibility of research projects. To do this we focus on the specific discipline of climate change. We apply Analytic Hierarchy Process as the tool for analyzing the problem and engaging experts in a constructive discussion. We believe our findings will help other researchers to identify key concepts regarding responsible research and innovation, assessing and monitoring the responsibility of research projects, starting processes of dialogue and, eventually, ranking different research proposals from the point of view of responsibility of preventing climate change.

GOVERNMENT POLICIES FOR ECOTOURISM DEVELOPMENT IN MANGROVE FORESTS OF IRAN

Marzieh Hajjarian, Assistant Professor/Natural Resources/Urmia University; Omid Hosseinzadeh, Assistant Professor; Farideh Delavari, PhD; Reza Abdi, Professor/Bradford University

Abstract

Ecotourism development in mangrove forests requires comprehensive and detailed plans to consider all aspects of ecotourism development and maintaince of the ecosystem. Ecotourism development in every region has benefits, costs, opportunities and risks. Considering all cases, there is a need for a convenient and accurate way to analyze the situation and take appropriate decisions. However, without careful planning and management that balance ecological, social, and economic objectives, it may lead to environmental damage. In order to achieve a pre-defined process, the Analytic Network Process method was used. The quantification using BOCR-interval arithmetic modeling was performed in association with Analytic Network Process (ANP) via consensus of multiple experts. The results of a comprehensive review of the development of ecotourism in mangrove forests showed that development of ecotourism is preferred to non-developed ecotourism. However, there are serious risks on the balance of the ecosystem and

environmental hazards.

Session Chair: Luis Antonio Bojórquez-Tapia, LANCIS UNAM, Mexico

5.1 INDUSTRIAL AND MANUFACTURING ENGINEERING

10:40 to 11:40 am
Room: Redstar

A MATHEMATICAL MODELLING APPROACH FOR MULTI-OBJECTIVE, MULTI-STAGE HYBRID FLOW SHOP SCHEDULING PROBLEM

Mujgan Sagir Ozdemir, ESOGU, Turkey
Abstract

The scheduling of flow shops with multiple parallel machines per stage, usually referred to as the hybrid flow shop (HFS), is a complex combinatorial problem encountered in many real world applications. The problem is to determine the allocation of jobs to the paralel machines as well as the sequence of the jobs assigned to each machine. Multiobjective nature makes the problem more complex. To solve the problem, a 0-1 mixed integer mathematical model is formulated in order to find out the best solution of the problem. Different objectives and criteria have been weighted to order the jobs on the machines. Model outcomes with different weights are compared.

AHP MODEL FOR SELECTING PACKAGING SYSTEMS IN FOOD INDUSTRY

Astrid Maria Oddershede, usach, Chile; Cristian Andres Mejias, USACH; Luis Quezada, Department of Industrial Engineering, Universidad de Santiago de Chile
Abstract

This paper addresses the problem regarding packaging systems in the food industry, specifically the lack of characterization for food packaging systems in Chile and the lack of a guiding method to decide the implementation of the most adequate system in a food production plant. The purpose of this research stems from the technical requirements associated with carrying food products from their processing to the final

consumer. Considering marketing perspective, packaging must be attractive in every way; hence, appropriate technology for each proposed package is required. This study proposes to consider also, qualitative aspects in the analysis. The multi-criteria methodology and the use of the Analytic Hierarchy Process (AHP), provides an approach that integrates technical and qualitative aspects identifying conflicting criteria. It starts from the examination of food industry current situation, in support of the development of characterization of packaging system. The results of this research offer a method based on empirical data to address the complex objectives and the link associated with the selection problem of packaging systems of the food industry in Chile.

DECISION ANALYSIS IN AN EMERGENCY DEPARTMENT TO EVALUATE THE OVERALL PERFORMANCE: A METHOD BASED ON AHP AND TOPSIS

Miguel Angel Ortiz Barrios, Universidad de la Costa, Colombia; Brandon Antonio Aleman Romero, Department of Industrial Engineering, Universidad de la Costa CUC, Barranquilla, Colombia; Janeth Rebolledo Rudas, Department of Quality Assurance, E.S.E. Hospital Niño Jesus, Barranquilla, Colombia; Heberth Maldonado Mestre, Department of Teaching, E.S.E. Hospital Niño Jesus, Barranquilla, Colombia; Arlet Beatriz Cataño Gonzalez, Department of Health Sciences, Universidad Libre, Barranquilla, Colombia; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Antonella Petrillo, University of Naples "Parthenope", Italy

Abstract

The aim of this study is to evaluate the overall performance of emergency departments in the hospital sector. A hybrid model with AHP and TOPSIS methods has been designed to evaluate the decision making model. AHP has been used to determine the criteria and sub-criteria weights. TOPSIS method ranks three hospitals from the Healthcare Sector according to the overall performance of their emergency departments.

Session Chair: Mujgan Sagir Ozdemir, ESOGU, Turkey

3.2 HEALTHCARE DECISION MAKING

12:00 to 1:00 pm
Room: Campanula

AHP IN EHEALTH: THE MISSING PUZZLE BETWEEN (USER'S') NEEDS ELICIATION, REQUIREMENTS DESIGN AND SPECIFICATION WRITING.

Giuseppe Fico, Universidad Politécnica de Madrid; Maria Teresa Arredondo, Universidad Politécnica de Madrid
Abstract

The AHP has been used in healthcare technology in several manners, ranging from user needs elicitation to decision making for health technology assessments and budget prioritization. The eHealth paradigm, defined as a catalyst for innovation in healthcare, can benefit from the AHP to systematically link user needs, user requirements and specifications reporting, when defining an eHealth-based solution. This paper describes the experience derived from the application of AHP in 3 cases.

ANALYTIC HIERARCHY PROCESS TO INFORM DISABILITY HOUSING DEVELOPMENT: TWO APPLICATIONS

Ali Lakhani, Griffith University; Heidi Zeeman, Griffith University
Abstract

A longstanding disability housing crisis across the developed world has meant that many individuals with disability do not have access to adequate housing. Disability housing development relies on multiple stakeholders with differing priorities making decisions to best meet service users' needs. This paper presents two strategies of how the Analytic Hierarchy Process (AHP) can be used to support disability housing development decisions. The two strategies described are: utilising AHP to establish the best disability housing development option, and second, utilising AHP to prioritise factors related to a disability housing development option. A systematic review of five databases concerning the use of AHP for disability housing development provided sources that informed the two strategies. AHP has the potential to

support disability-housing decisions and provide knowledge about priorities that underpin disability housing development for various stakeholders. It is important that future research explore how AHP may benefit disability housing development decisions, and further how the decisions impact the subsequent lives of service users.

IS THERE A TRADEOFF BETWEEN MULTICRITERIA DECISION ANALYSIS EASE OF USE AND RIGOR?

James Dolan, University of Rochester; Olena Cherkasky, University of Rochester; Peter Veazie, University of Rochester

Abstract

Multi-criteria decision analysis (MCDA) methods are well suited to serve as the basis for new clinical decision support systems to facilitate delivery of high quality health care. However, MCDA methods differ in ways that could affect their ease of implementation into practice. The extent to which it is necessary to sacrifice ease of use to ensure robust decision support when choosing a MCDA method for clinical decision support is currently unknown. We conducted a five group, cross-sectional study comparing decisions made following use of a tabular balance sheet alone with decisions made after use of MCDA methods with varying levels of procedural simplicity and theoretical development: a repeat balance sheet (which served as a control), a decision dashboard, ordinal MCDA, TOPSIS, and the Analytic Hierarchy Process (AHP).   The study sample consisted of members of an Internet survey panel. The decision scenario was a hypothetical choice among four cardiovascular risk reduction options. Study outcomes included preferred option, confidence in choice, ease of use, values clarity, and decision-related uncertainty. We found statistically significant differences among the MCDA methods with regard to changes decision confidence, preferred option, ease of use, and uncertainty. Rates of change in initially preferred option after MCDA use increased progressively as the intensity of decision support increased (p<0.001). The AHP was associated with statistically higher decision confidence compared to the balance sheet and lower decisional uncertainty compared to the dashboard. In conclusion, increasing levels of complexity across the spectrum of MCDA methods used in this study were associated with more frequent changes in preferred option, suggesting choices that are more consistent with personal preferences, but was not associated with consistent decreases in usability. Of the

methods studied, the AHP seems uniquely capable of providing both high levels of decision support and ease of use.

Session Chair: James Dolan, University of Rochester

1.1 MULTI-CRITERIA DECISION ANALYSIS THEORY AND METHODOLOGY

12:00 to 1:00 pm
Room: Great Western 1

AHP FOR STUDENT DECISIONS IN A MONTESSORI ELEMENTARY CLASS

William Adams, Decision Lens Inc
Abstract

In this paper we devise and use a new pairwise comparison questionnaire based upon a Liskert scale that enables Montessori elementary students to express their preferences for classroom jobs and areas of cleaning responsibility. In addition, we develop the SimpleAHP web application so that elementary students can analyze the results of their questionnaires on their own.   We find that the simplified questionnaire works well with our students and holds promise to allow more people access to AHP.

Session Chair: William Adams, Decision Lens Inc

6.2 BUSINESS AND INNOVATION SYSTEMS

12:00 to 1:00 pm
Room: Great Western 2

USE OF AHP-BASED CLUSTERING ANALYSIS FOR EVALUATING CITIES IN TURKEY ACCORDING TO CONSUMPTION EXPENDITURES

Kamil ÇELİK, Gazi University; Asli CALIS, Gazi University; Alptekin SOKMEN, Gazi University; Cevriye GENCER, Gazi University
Abstract

The purpose of this study is to classify the cities of Turkey with regard to

their consumption expenses. Thus, it is ensured to group the cities together whose consumption expenses are similar to each other. In this manner, the concerned people can get information about the socio-economic circumstances and standard of living of these cities. Through this information it's enabled to study devoted to satisfying the needs of society. Technique: This study has got four stages. First stage: This is the stage which statistics are collected. The statistics are obtained from Turkey Statistical Institute (TSI) web site and they involves the years 2012-2014. The cities in Turkey are examined with regard to their consumption expenses on the basis of Nomenclature of Territorial Units for Statistics-2 (NUTS). It is seen that these statistics consists of 9 criterion. Second stage: In this stage, the 9 criterions specified in the first stage are examined through Analytic Hierarchy Process (AHP), which is one of the multiple-criteria decision analysis techniques. A comparison matrix is formed for these 9 criterions by seeking the expert opinion from three academicians who study in engineering field. The numerical value of matrix is obtained by having a geometric average of expert assessments. "Expert Choice" program improved for AHP is used in practice. The criterions under %10 are eliminated. At last, it's decided to use 5 criterions below in the study. Third stage: Clustering is made in this stage. Cluster analysis technique from Data Mining techniques is used for it and taken advantage of k-means algorithm. Because there are 7 regions in Turkey, the number of cluster is specified as 7 (k=7). So, it's enabled to form 7 clusters. Fourth stage: In this stage, the study is ended by interpreting the results obtained.

AN INTEGRATED AHP AND WEIGHTED FUZZY GOAL PROGRAMMING MODEL FOR IS PROJECT SELECTION

Mohammed BELLAHCENE, Management Departement, Tlemcen University, Algeria; Mohammed Mekideche, Tlemcen university; Fatima *Zohra BENAMAR, Tlemcen university*

Abstract

The purpose of this paper is to develop an integrated AHP and Fuzzy Goal Programming methodology which deals the imprecise data and offer more flexibility. The proposed method includes the following steps: At first, an expert team is formed which identifies the decision criteria and alternatives and builds a hierarchical model for IS project selection. After that, the AHP is used in order to obtain weights of each criterion and

project. At the end, a Weighted Additive Fuzzy Goal Programming model (WAFGP) is formulated and used to complete the project selection decision. In order to illustrate the use and advantages of this approach; a hypothetical example has been exposed. The results show the quality of the support which the proposed model provide to the IS project selection decision.   Despite its advantages, the methodology proposed here neglects the uncertain nature of decision maker's judgment and the interdependencies among criteria and alternatives.

ROUGH-RULES-BASED DECISION MODEL FOR MULTIPLE OBJECTIVES PORTFOLIO OPTIMIZATION

Kao-Yi Shen, Chinese Culture University; Gwo-Hshiung Tzeng, National Taipei University
Abstract

This study aims to propose a novel hybrid approach for the multiple objectives portfolio optimization problem. Two types of heterogeneous inputs are infused to construct a multiple objectives optimization model: (1) a group of rough decision rules for selecting stocks with superior financial prospects (induced from historical data by rough machine learning) and (2) the preferential structure from decision makers (collected by questionnaires). Five blue chip stocks from the Taiwan stock market are illustrated and examined in this work, from 2010 to 2015; in addition, the prevailing ANP-based method for multiple objectives portfolio optimization is compared with the proposed approach
Session Chair: Kamil ÇELİK, Gazi University

2.2 GOVERNMENT POLICY AND DECISION MAKING

12:00 to 1:00 pm
Room: KingFisher

ANALYSIS OF THE SAUDI NATIONAL TRANSFORMATION PROGRAM/ ANP APPLICATION

Asma M Bahurmoz, King Abdulaziz University, Saudi Arabia; Hussein Mohammed Alkahily, Independent Finance Consultant
Abstract

In October 2015, Saudi Council for Economic and Development Affairs

proposed the National Transformation Project (NTP) 2020 in response to drop in price of oil to around US $ 26; which threw the country into an unexpected deficit of $100 billion. The NTP focusing on the key drivers for economic growth. Although only outline of the NTP is released, we know the problem is very complex as it involves numerous actors, and many entangled criteria and elements. Knowing that the government is taking a developmental approach that is inclusive, transparent and accountable to all stakeholders in society. Hence, we opted to implement the Analytic Network Process. The ANP is a sound methodology for structuring the problem to find which policy to focus on to make the transformation as effective as possible taking into account social and political factors in addition to economic ones.

RANKING TERRORIST NODES OF 9/11 NETWORK USING ANALYTICAL HIERARCHY PROCESS WITH SOCIAL NETWORK ANALYSIS

Pankaj Choudhary, Defence Institute of Advanced Technology,Pune; Upasna Singh, Department of Computer Engineering   Defence Institute of Advanced Technology

Abstract

On September 11, 2001, United States witnessed one the most tragic terrorist attacks in history, well-known as 9/11 attack. Four coordinated suicide terrorist attacks on high profile U.S. landmarks were executed by Islamic terrorist group Al-Qaeda. Social Network Analysis (SNA) has been accepted worldwide to be the most promising method for investigating such type of terrorist attacks. In prior research, various centrality measures of SNA have been discussed for identifying key players and attaining terrorist target lists/ranking. Most of the times, these measures result in different rank ordering patterns and different set of key players. As a solution to this problem, Analytical Hierarchy Process (AHP) can be plugged in with SNA centrality measures for obtaining improved results with the essence of subjective or objective choices of the decision maker. In this paper, 9/11 terrorist network is analyzed using AHP with SNA centrality measures as decision criteria, to discover the overall rank ordering of 19 hijackers and their affiliates, involved in the attack. Further, sensitivity analysis is discussed to deal with changes in subjective judgements. The experimental results demonstrate that the combination of AHP with SNA centrality measures results in propitious rank ordering

in considered terrorist network.

SOCIAL INNOVATIVE POLICIES USING LOCAL KNOWLEDGE TRANSFER: AHP/ANP MODELS FOR THE ROMANIAN COOPERATIVE STRUCTURES

Adriana Agapie, Bucharest University of Economic Studies, Romania
Abstract

In agriculture, non-profit management as a preferable alternative to the public management is regarded as being at the core of the cooperative's integration in the context of both social and market economy. Yet, at least as important as the management, either public or nonprofit, is the legislative edict stating the conditions under which new institutions are founded as well as their administrative composition, financing sources and tasks. This paper comprises the full description of two distinct models built and estimated in the context of the Analytical Hierarchy Processes (AHP) and Analytical Network Processes (ANP) theory. Farmers, representatives from agricultural administrative structures and associations from all the important regions in Romania contributed to the elaboration and estimation of this model, through a program founded by the Regional Network of Rural Development (RNDR). This model is developed with the aim of understanding and quantifying the main risk factors in the optimal design and institutional functioning of the cooperative structures in agriculture and its output constitute one of the most scientific recommendation for a new legislative project. Results refer to a specific optimal distribution of the members, fiscal policies and particular sources of funding. Sensitivity analysis show how various political, social or economic arguments impact on the optimal determination of the main aspects of the cooperatives ' legislative edict .

Session Chair: Asma M Bahurmoz, King Abdulaziz University, Saudi Arabia

5.2 INDUSTRIAL AND MANUFACTURING ENGINEERING

12:00 to 1:00 pm
Room: Redstar

AN EMPIRICAL INVESTIGATION ON HOW ANALYTIC NETWORK PROCESS GROUP DECISION MAKING INFLUENCES PROJECT RISK MANAGEMENT

Omid Hosseinzadeh, Assistant Professor; Marzieh Hajjarian, Assistant Professor/Natural Resources/Urmia University; Reza Abdi, Professor/Bradford University

Abstract

This paper is based on an empirical study of two interior design projects manager in a pair of quite similar (side by side) decoration projects. The purpose of this study is to develop an operative strategy for project risk management using Analytic Network Process. In this research we did an investigation on how group decision making influences managing risk in such a project. This was a rare occasion where the inputs, as opposed to the outputs, of the risk management process were examined. More problematically, the precise nature of the inputs does not seem to have been explored adequately in the previous researches. In this research, seven decision making models are designed for different phases of projects. The effect of dictatorial management approach and a group management approach on the risk management are compared. Comparison of the status of the projects run by the two decision making approaches showed significant differences between their cost and the duration.

DEVELOPMENT A KEY COMPETITIVENESS INDICATORS FOR DISASTER MANAGEMENT

Antonella Petrillo, University of Naples "Parthenope", Italy; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Federico Zomparelli, University of Cassino and Southern Lazio

Abstract

Organizations are often encouraged to develop proactive and rigorous safety management practices. Safety improvements are often very expensive. Thus, companies try to use more and more innovative and effective tools to reduce the safety costs. The purpose of this study is to identify and prioritize the key competitiveness indicators to develop a model for the analysis of safety costs using AHP technique.

USING AHP METHOD FOR EXPERTS PREFERENCE ANALYSIS IN RISK MANAGEMENT OF PROTECTED AREAS: A CASE STUDY IN VIETNAM

Huong Quynh Nghiem, University of Greifswald, Germany

Abstract

From 1990 to 2015, the World's forest resources decreased 129 million ha (FAO, 2015). Globally, deforestation has continued to increase. To respond, reliable and up to date information on the state of forest resources is essential to support decision-making for investment and policymaking in both forestry and sustainable development. Many countries have developed protected area systems as a core strategy to protect national biodiversity and environment. The World Conservation Monitoring Centre rated Vietnam as the 16th most biologically diverse country in the world. A big challenge to biodiversity conservation in Vietnam is human disturbances of local communities living in the buffer zones and surrounding. An analysis of human factors and natural hazard was carried out with integration of AHP and GIS in decision-making process. A sample model was developed in order to highlight the area where have the most problem.

Session Chair: Antonella Petrillo, University of Naples "Parthenope", Italy

LUNCH & POSTER SESSION 1

1:00 to 2:30 pm
Room: Atrium

POSTER SESSION 1

A NUMERICAL EXPERIMENT ON THE POSSIBILITY OF GETTING THE SOLUTION WITH MUCH LESS PAIRWISE COMPARISONS

Robin Rivest, HEC Montreal
Abstract

The number of comparisons required to fill the pairwise comparison (PC) matrix used in the scientific study of preferences and in particular in the AHP can become tedious as the number of alternatives considered becomes larger (grows with O(N^2)). Priority vectors which are obtained from normalizing principal eigenvectors of PC matrices can be computed even if some PC entries are missing under some conditions. This study aims to determine whether or not some PC can be systematically omitted in the elicitation process of the AHP without significantly distorting the final solution. It is expected that these omissions will be guided by a number of simple heuristics that will have been verified empirically by way of numerical simulations. The simulations compare priority vectors obtained from complete matrices with those obtained by omitting some PC entries. The measure used to evaluate distances between priority vectors is the angle based on the cosine similarity of vectors.

MULTI-CRITERIA ANALYSIS OF ALTERNATIVE POWER GENERATION IN PARAGUAY

José Saldaña, Facultad Politécnica, UNA; Diego Martínez, Facultad Politécnica, UNA; Félix Fernández, Facultad Politécnica, UNA; Raúl Emilio Amarilla, Polytechnic Faculty, National University of Asuncion; Gerardo Alejandro Blanco, Polytechnic Faculty, National University of Asuncion; Victorio Oxilia, Facultad Politécnica, UNA
Abstract

Paraguay is a landlocked country in South America, with a surface area of 406,752 km2, bordered by Argentina to the south and southwest, Brazil

to the east and northeast, and Bolivia to the northwest. With a population of 6.5 million inhabitants by 2012, Paraguay is ranked 107th in the Human Development Index by United Nations Development Program (UNDP, 2009). The country has a GDP per capita of USD 4380 (2014), being the second poorest country in South America. Notwithstanding, the Paraguayan economy recently has grown at very large rates (about 9% per year in the period 2010-2012), but resulting in high volatility, mainly as a result of increased agricultural exports, especially soybeans and beef. Due to the economic structure of a landlocked country, rivers (Paraguay and Parana) play a key role in the economic life the country. Rivers not only provide access to the Atlantic Ocean to export products, but are also used as sites for the hydroelectric power plants that have made Paraguay one of the world's largest exporters of hydropower. Under this context, this renewable energy source, compatible with a model of sustainable development, must be the cornerstone of the energy policy in Paraguay. The current energy surplus has to be used for supplying the power demand in the short and medium term with the incorporation of large industries in order to stabilize the economic growth. Moreover, considering the current demand growth, such surplus levels will decrease over the course of time, and this can jeopardize the sustainability of the proposed development policies. Therefore, it is imperative to start the analysis for multi-criteria evaluation of the installation of new sources of power generation. In this sense, the proposed work presents the Analytic Hierarchy Process (AHP), to the prioritization of several new strategies of power generation, considering technical, environmental, economic and socio-political criteria.

METHODOLOGICAL APPROACH TO FORMULATE PRODUCTION AND OPERATIONS STRATEGIES IN THE SMES USING THE ANP METHODOLOGY

Alexis Olmedo, Andres Bello University, Chile
Abstract

This work aims to develop a methodology based on ANP in order to help formulate strategies must prioritize SMEs, considering two types of strategies: production or operations and thus facilitate the process of decision making and reduce the risk for companies by their nature, are faced with greater force to the problem of resource allocation, thereby

achieving an improvement in performance and use of the opportunities offered by the sector in which they operate. For this, a literature review will be done by identifying the main references to address the problems described and subsequently proposed two case studies which are two companies with a focused SMEs in production and the second service delivery model will be applied.

BEST ALTERNATIVE MODELS TO INCREASE LOCAL PRODUCT CONSUMPTION

Puren Veziroglu, Cukurova University; Kenan Ciftci, Ege University; Bulent Miran, Ege University; Ayca Nur Sahin, Ege University; Faruk Emeksiz, Cukurova University

A local agricultural product means food grown in places close to the province, country or region that we live in. Consumers' preference of local products will contribute significantly to the farmers' welfare of the areas with high agricultural potential. Within the scope of the study, it has been analyzed under which conditions made consumer tendencies towards local products will turn into behavior of preferring the local products more. The data of the study have been obtained through face to face interviews with agricultural product consumers. Consumers selected randomly from university students in Adana where is the fourth biggest city of Turkey and has a very high potential of agricultural production. Firstly through local product preference model with the aid of AAS (Analytical Network Process) the weights that consumers give to the various criteria and choices have been determined. Based on these weights the combinations of most suitable conditions that consumers will prefer were determined. By taking into consideration the combination of consumers' three conditions with highest probability were examined. In determining the best design, the method of "the best combinations of choices" (BeCA) was employed. BeCA gives optimum homogeneous preference combinations with the aid of 0-1 programming. The best combinations that were obtained were studied thoroughly with statistical analyses.

KEYNOTE SPEAKER: ADRIANA VELAZQUEZ BERUMEN

Plenary Session
2:30 to 3:30 pm
Room: Great Western 1

COFFEE BREAK

3:30 to 4:00 pm
Room: Atrium

1.2 MULTI-CRITERIA DECISION ANALYSIS THEORY AND METHODOLOGY

4:00 to 5:00 pm
Room: Campanula

AN INTERACTIVE PROCEDURE TO DETERMINE THE ELEMENTS OF A PAIRWISE COMPARISON MATRIX

Jozsef Temesi, Corvinus University of Budapest, Hungary
Abstract

One of the findings of our previous research aimed at investigating the properties of pairwise comparison matrices (PCM) in various decision-making problems was that the elicitation process, which provides the initial data for further analysis, can influence the final result (preferences, weights). The elicitation process is crucial for getting consistent, near-consistent or inconsistent PCM. Decision support systems apply different approaches in practice. The proposed interactive method can be applied for individual decision-making problems with verbal scale. The involvement of the decision maker (DM) and some special rules can ensure that the process either provides a near-consistent and error-free PCM or demonstrates the inability of the DM to reach that goal.

AN OPTIMIZATION APPROACH FOR THE EIGENVECTOR METHOD

János Fülöp, MTA SZTAKI, Hungarian Academy of Sciences
Abstract

Pairwise comparison matrices play an important role in multiattribute

decision making; they are applied to derive priorities or implicit weights for a given set of decision alternatives. Several approaches exist regarding how to derive a suitable vector of weights from a pairwise comparison matrix. Saaty proposed the eigenvector method in which the principal eigenvector of the pairwise comparison matrix serves as the vector of weights. Another class of approaches is based on optimization methods and proposes different ways for minimizing the difference between the pairwise comparison matrix and the consistent matrix constructed from the weights. In the talk, we show that the eigenvector method also can be considered from the aspect of the optimization approach. Namely, the principal eigenvector can be obtained from the optimal solution of a convex optimization problem. We show that this approach is very useful in the case of incomplete pairwise comparison matrices. Computational experience is also presented.

ANALYSES OF PAIRWISE COMPARISONS WITH A TERNARY DIAGRAM

Takafumi Mizuno, Meijo University, Japan; Kouichi Taji, Nagoya University
Abstract

We provide a method to detect weights of three elements, which can be substitute for the pairwise comparison method in AHP. In the method, decision makers detect the weights by pointing a point on a ternary diagram. We can also analyze ordinary pairwise comparisons with the ternary diagram. We show the following results: (1) the principal eigenvector, which is an output of the pairwise comparison method, is arranged in an inner triangle in the diagram, (2) a new type of contradiction on parametric pairwise comparisons is represented in the diagram, (3) decision makers can check easily a cycle of preference with the diagram, and (4) the area of an inner triangle has very close relationship with the C.I.

Session Chair: János Fülöp, MTA SZTAKI, Hungarian Academy of Sciences

6.3 BUSINESS AND INNOVATION SYSTEMS

4:00 to 5:00 pm
Room: Great Western 2

A DECISION APPROACH FOR PRIORITIZING FACTORS AFFECTING VESSEL CREW SATISFACTION USING ANALYTIC HIERARCHY PROCESS

Gozde Kadioglu, Student- Istanbul Technical University; Umut Arıcan, Student; Cemil Ceylan, Assist. Prof.; Cigdem Kadaifci, Istanbul Teknik Universitesi, Turkey

Abstract

This study aims to examine factors affecting the satisfaction of vessel crew in a specific line company in terms of organizational conditions, work environment, economic conditions, vessel properties, and living conditions. In order to determine which factor affects the employee satisfaction more, the Analytic Hierarchy Process is used and the criteria are prioritized based on the pairwise comparisons of the employees working in the vessels of this line company. Due to different characteristics of vessels and also varying scope of the work performing by different job titles, besides the whole results, the findings are interpreted based on the vessel types and the job titles. The shipping industry is a very specific industry which requires very special trainings, certificates, and profession to be employed in. Employee qualifications, employee errors in shipping accidents, employee engagement, and employability indicators are investigated by using different approaches, and the relationship between organizational commitment and job satisfaction is examined in a few studies. Yet, there is a lack of the literature focuses solely on factors affecting the employee satisfaction in this industry. Among several reasons of this lack, the nature of the job which makes harder to collect data from vessel crew, the complexity and scope of the problem which requires more time and effort to model, the lack of academic and practical expertise both on the shipping industry and decision making discipline can be listed.

A DECISION MODEL FOR SELECTION OF THE BEST AIRLINE COMPANY: A CASE OF LONDON-ISTANBUL ROUTE

Berk Kucukaltan, Trakya University, Edirne/Turkey; Ilker Topcu, Istanbul Teknik Universitesi, Turkey

Abstract

This study aims to evaluate the preferences of passengers for airline

companies. The research provides a decision model to determine the factors affecting airline company selection of passengers, to prioritize these factors, and to find the most preferred airline company. A case study is implemented for scholarship students flying at the London-Istanbul route. Based on the literature review and interviews, the main criteria are deduced as image of the company, service quality, ticket price, total duration, existence of direct flight, loyalty program, and access to/from the used airport of the company. The problem on hand can be addressed by AHP. The findings of the case study will reveal the preferences of students for airline companies at the selected route and the importance of criteria.

MEASUREMENT OF THE IMPACT OF THE NEWS ON STOCK PRICES

Pedro Palominos, Department of Industrial Engineering, Universidad de Santiago de Chile; Luis Quezada, Department of Industrial Engineering, Universidad de Santiago de Chile; Cristian Mateluna, University of Santiago of Chile
Abstract

This paper presents a quantitative method to measure the impact of news on the price of the stock. It combines the Analytic Hierarchical Process (AHP) and Artificial Neural Network (ANN). AHP is used to with the purpose of weighting the news and converting them from a qualitative variable into a quantitative. This information is used as input to the Artificial Neural Network (ANN) models, to see the impact of the news in predicting price. It is concluded that when the news are included as an additional variable in the ANN models, the performance measurements increase.

Session Chair: Gozde Kadioglu, Student- Istanbul Technical University

2.3 GOVERNMENT POLICY AND DECISION MAKING

4:00 to 5:00 pm
Room: KingFisher

AN EVOLUTIVE DESCRIPTIVE MAPPING VISUALISATION TOOL WITH THE INTEGRATED GAIA-AHP

Alessio Ishizaka, University of Portsmouth, U.K.; Sajid Siraj, Leeds University Business School; Phillipe Nemery, SAP BeLux
Abstract

Although Multi-Criteria Decision Making methods have been extensively used, their descriptive use has been rarely considered. In this paper, we add an evolutionary description phase as an extension to the AHP method that helps policy makers to gain insights into their decision problems. The proposed extension has been implemented in an open-source software that allows the users to visualise the difference of opinions within a decision process, and also the evolution of preferences over time. The method was tested in a two-phase experiment to understand the evolution of opinions on energy sources. The proposed tool can help policy makers in better understanding planning problems that will lead towards better decisions.

AN INTER-ORGANIZATIONAL FRAMEWORK FOR PUBLIC IS MERGE DECISIONS

Enrique Mu, Carlow University, U.S.; Howard A Stern, Carlow University, U.S.
Abstract

We propose the use of an inter-organizational IS (IOS) theoretical framework to identify and analyze the factors to consider in a decision to merge public information systems. Many times BOCR Analysis of IS-related decisions is made strictly on economic generic variables. However, we propose, and illustrate with a case, a broader view where using contingency theory to identify environmental specific factors and assimilation theory to identify post-implementation factors. This proposed theoretical framework, derived from organizational and IOS research literature, allows the identification of decision factors beyond traditional economic considerations. These factors are later evaluated using a multi-criteria ANP/BOCR analysis.

DECISION MODEL TO WEIGHT INDICATORS FOR MONITORING RESPONSIBLE RESEARCH AND INNOVATION IN NATIONAL R&D SYSTEMS

Irene Monsonís-Payá, Polibienestar Research Institute. Universitat de Valencia; Monica Garcia-Melon, Universitat Politecnica de Valencia,

Spain; Félix Lozano-Aguilar, Universitat Politecnica de Valencia
Abstract

This study proposes a decision model based on Analytic Hierarchy Process to weight indicators in the field of Responsible Research and Innovation (RRI). The set of indicators proposed so far to monitor RRI initiatives by the Expert Group on Policy Indicators for Responsible Innovation of the UE are considered too large to be used at a cross-cutting level in certain R&D schemes. Therefore, in this paper we propose a methodology based on AHP and a group of stakeholders to select those more relevant in each R&D context by assuring an appropriate coverage of the issue.

Session Chair: Alessio Ishizaka, University of Portsmouth, U.K.

5.3 INDUSTRIAL AND MANUFACTURING ENGINEERING

4:00 to 5:00 pm
Room: Redstar

EMPLOYABILITY ANALYSIS IN PROFESSIONAL EDUCATION

Camila A. M. Silveira, Sao Paulo State University; Valerio Salomon, Sao Paulo State University, Brazil
Abstract

Under unfavorable economic scenarios, companies need to decrease their costs. Uncertainty, as how long will last the scenario, brings a dilemma to human resources managers: Should an employment be terminated? In case of a suspension or a termination, a decision-making arises: which employment shall be terminated? In service companies, as the education institutions, employments are associate with employees. The decision-making changes to should an employee be fired? Obviously, the decision shall not be based only on costs. That is, a multi-criteria decision model shall provide a complete analysis. This paper presents a model for employability analysis in a Brazilian institution of professional education.

EMPLOYEE PERFORMANCE EVALUATION USING ANALYTIC HIERARCHY PROCESS (AHP) FOR CHEMVI LABORATORY SDN. BHD.

Rafikul Islam, International Islamic University Malaysia; Nagendran

Periaiah, International Islamic University Malaysia

Abstract

As market becomes more competitive, the management of human capital or retaining high performance employees becomes a major challenge for modern organization. Evaluation of employee performance is an important activity of human resource managers. The present paper applies AHP to evaluate performance of employees working in Chemvi Laboratory Sdn Bhd, a private Malaysian company.   Criteria and subcriteria for the performance evaluation were obtained through group discussion with senior manager of the company Bhd. In fact, five senior managers were interviewed using AHP questionnaires and weight for criteria and subcriteria were evaluated using AHP Calc version 24.12.13 by Klaus D. Goepel. Overall, the management and employees are upbeat with the results obtained via AHP as the criteria and their meanings were clearly defined and communicated to the employees. Employees who performed poorly were also identified and recommendations were made on which criteria that they scored lower and how to improve their performance on those.

PREDICTION OF USER BEHAVIOUR ON THE BASIS OF KEY DETERMINANTS OF SUSTAINABILITY FOR CONSTRUCTION PRODUCTS WITH THE HELP OF THE ANALYTIC HIERARCHY PROCESS

Mariia Rochikashvili, TU Bergakademie Freiberg; Jan Clemens Bongaerts, TU Bergakademie Freiberg

Abstract

The variety of construction products on the market makes a decision-making process complex. The main purpose of this study consists in identifying the relative importance of sustainability characteristics in selecting construction products, in particular, wall paints, by non-experts, i.e. private households. For this purpose, with the hypothesis that environmental and health safety have a high priority, an AHP model is used for a comparison of three alternative wall paints, designed in the Super Decisions Software.

Session Chair: Rafikul Islam, International Islamic University Malaysia

1.3 MULTI-CRITERIA DECISION ANALYSIS THEORY AND METHODOLOGY

5:15 to 6:15 pm
Room: Campanula

COMBINING PROMETHEE AND AHP: MATCHING THE MEANING OF WEIGHTS

Henk Broekhuizen, University of Twente; Karin Groothuis-Oudshoorn, University of Twente; Marjan Hummel, University of Twente, Dept. HTSR
Abstract

No specific guidelines are provided on how to determine weights in multi-criteria decision analyses with PROMETHEE. Among other weighting methods, the AHP has been proposed as a tool to support the elicitation of weights. However, little attention has been paid to the meaning of the weights derived, and the match of these weights with the model requirements of PROMETHEE. We discuss the diversity in meaning of weights in multi-criteria decision analysis, and proposed recommendations to prevent possible mismatches when combining AHP with PROMETHEE.

LOCAL PROPERTIES OF SYNTHESES FOR CATEGORIZED AHP

Takafumi Mizuno, Meijo University, Japan; Eizo Kinoshita, Meijo University
Abstract

If alternatives are divided into some categories, decision makers often enforce AHP on every category and synthesize their results. We provide principles that the synthesis must satisfy. These principles have axiomatic descriptions and represent a relation between local properties and results of the synthesis.

WHAT IS THE APPROPRIATE SAMPLE SIZE TO RUN ANALYTIC HIERARCHY PROCESS IN A SURVEY-BASED RESEARCH?

Paolo Melillo, Second University of Naples; Leandro Pecchia, University of Warwick, UK
Abstract

Analytic Hierarchy Process (AHP) is often adopted in survey-based research activities and the number of participants involved in AHP studies ranges from few experts to hundreds of interviewed people. A common goal of survey research is to collect data representative of a population and, to this end, determining sample size is essential. The question then is, what is the appropriate sample size to run AHP in a survey-based study? To the best of the authors' knowledge, no previous study addressed the proposed research question in the field of AHP-based survey. The current study aimed to propose a simulation approach for addressing the question of appropriate sample size for AHP-based survey. The proposed approach and the related findings will be presented and discussed.

Session Chair: Takafumi Mizuno, Meijo University, Japan

6.4 BUSINESS AND INNOVATION SYSTEMS

5:15 to 6:15 pm
Room: Great Western 2

A CLOUD MIGRATION DECISION SUPPORT SYSTEM FOR SMES IN TAMIL NADU (INDIA) USING AHP

Berlin Mano Robert Wilson, Sheffield Hallam University; Babak Khazaei, Sheffield Hallam University; Laurence Hirsch, Sheffield Hallam University
Abstract

Cloud computing is a new computing paradigm which has the potential to speed up Information Technology (IT) adoption among SMEs in developing economies. Its successful implementation can present SMEs with various benefits like reduced IT costs, high scalability and faster time to market. In recent years, many research have been carried in both academia and in businesses to explain the features, benefits and risks of cloud adoption. Literature review reveals that there are existing frameworks available to support cloud migration. However, there is very little literature available to support cloud migration decisions, which covers the whole cloud migration process for SMEs in Tamil Nadu. This paper aims to fill that gap by presenting the SME decision makers (DMs) with a decision support tool. The proposed cloud migration decision support system (CMDSS) will be based on Analytical Hierarchy Process (AHP) and will aid decision makers to make cloud migration decision

effectively by suggesting a path from where to start, to how to complete the migration.

DECISION MAKING ON E-ASSESSMENT CRITERIA IN RUBRICS

Blazenka Divjak, University of Zagreb, Croatia; Nina Begicevic Redep, University of Zagreb, Croatia
Abstract

This paper describes the way in which rubrics and the Analytic Hierarchy Process (AHP) can be used in a study program or course in order to assess fulfillment of learning outcomes (LOs) when students are involved in problem solving. In the process of determining weights of e-assessment criteria in rubrics, we have used the AHP and group decision making. The case study of problem solving exercise in the course Discrete Mathematics with Graph Theory (DMGT) is presented in the paper.

VISITOR FLOW OF CULTURALLY IMPORTANT AREAS: AN AHP PERCEPTION ON THE TRAIL SELECTION IN SRIPADA MOUNTAIN AREA OF SRI LANKA

Malinda Siriwardana, Graduate School of Life and Environmental Science
Abstract

A culturally important area is an asset for a country. While the importance is more on local people, global importance get strengthened when it becomes a world heritage. The Sripada mountain is one of the culturally important areas located in the world heritage site, Peak Wilderness in Sri Lanka. It may be the only mountain that four major religions venerate and believe there is a link according to their religion with their own beliefs and practices. There are many trails to climb the Sripada mountain. The purpose of this paper is to examine the relationship between the selection of a trail and its consequences to the sustainability in the Sripada mountain region using the Analytic Hierarchy Process (AHP). This research mainly focuses on discussing the importance of factors governing the flow of visitors along trails. This research uses two approaches to rank trails to find out the influence of factors on trail selection using AHP analysis in order to make future scenarios for sustainable environment decision making. The two approaches known as data-directed and user-directed were used in this research. The data directed approach uses geographical explanations and AHP whereas the

user directed approach uses questionnaire only for experts and AHP on trail ranking hence the visitor flow.

Session Chair: Nina Begicevic Redep, University of Zagreb, Croatia

2.4 GOVERNMENT POLICY AND DECISION MAKING

5:15 to 6:15 pm
Room: KingFisher

ADRESSING UNCERTAINTY AND COMPATIBLITY IN AHP MODELING: PROJECT PORTAFOLIO SELECTTION FOR GEF MEXICO

Luis Antonio Bojórquez-Tapia, LANCIS UNAM, Mexico; Paola Antonio Gómez-Priego, Laboratorio Nacional de Ciencias de la Sostenibilidad; Lakshmi Antonio Charli-Joseph, Laboratorio Nacional de Ciencias de la Sostenibilidad
Abstract

Here we addressed through a practical case the problem of dealing with both the uncertainty in pairwise comparisons and the compatibility amongst alternative AHP representations. Our approach was implemented for integrating a portfolio of projects to be presented by Mexico to the Global Environmental Facility (GEF). Results showed the importance of considering uncertainty/compatibility in AHP implementation aiming to integrate multiple viewpoints from representatives of international institutions, civil society organizations, and the public sector alike.

FACTORS AND THEIR INFLUENCE IN DEVELOPING FOOD COOPERATIVES

Anna Florek-Paszkowska (Greda), Jagiellonian University, Poland
Abstract

Consumption saving practices are the community response in cities to the crisis that hit Europe and has caused the reactivation and creation a new form of food cooperatives. Consumer cooperative movement has a long tradition in Poland dating back to 1816. The first consumer cooperative, "Mercury", was founded in 1869 in Warsaw, while the first food cooperative associations were established in the 1906. Political events in

our country after 1945 caused the interruption of the cooperative tradition. The current model of food cooperatives, as informal initiatives is a completely new phenomenon in Poland. Such a society for the first time was established at the beginning of 2010. It was the Warsaw Food Cooperative. Currently, in Poland there are about thirty informal food cooperatives. Worldwide, cooperatives have more than 1 billion members. Agricultural and food cooperatives represent a significant portion of the global cooperative sector in developed and developing countries. The paper presents the application of the Analytic Network Process (ANP) in prioritization of crucial factors that affect stakeholders involved in food cooperative development. The research was made based on questionnaires with experts (members and owners) of „consumption oriented" food cooperatives in the Lesser Poland Voivodeship.

A NEW BUDGET ALLOCATION MODEL BASED ON EFFICIENCY ANALYSIS FOR PUBLIC R&D GRANT PROGRAMMES

Betül Cansu Özçakmak, The Scientific and Technological Research Council of Turkey; Metin Dağdeviren, Department of Industrial Engineering, Gazi University, Ankara, Turkey
Abstract

This study proposes a new budget allocation model based on efficiency analysis for government support programs. The Scientific and Technological Research Council of Turkey subsidizes 350 million Turkish Liras every year via 13 support programs for industrial research and development (R&D). We aim to allocate this budget among support programs analytically. Firstly, impacts of R&D grants are examined. When making an impact analysis several criteria should be taken into consideration such as growth rate, and number of employed R&D personnel. Therefore, this is a multi criteria decision making problem. Secondly, a budget allocation model that uses results of impact analyses based on AHP is established. As a result, correct budget allocation for government R&D supports could be provided thanks to suggested model.

Session Chair: Anna Florek-Paszkowska (Greda), Jagiellonian University, Poland

5.4 INDUSTRIAL AND MANUFACTURING ENGINEERING

5:15 to 6:15 pm
Room: Redstar

CRITICAL PROCESSES PRIORITIZATION IN A SANITARY COMPANY USING ANALYTIC HIERARCHY PROCESS

Claudio Javier Macuada, Universidad de Santiago de Chile; Francisca Jimena Fábrega, Universidad de La Serena; Astrid Maria Oddershede, usach, Chile
Abstract

This paper proposes a multi-criteria approach to identify the most relevant processes in a sanitary company that could affect continuity of service based on their legal impact, image, financial, environmental and social. Currently business continuity planning and contingency planning are elements of control that companies manage to determine the availability of their most critical processes in the event of an outage. Having a ranking of processes that may be more critical for the organization is vital for sustainable development and/or even the survival of any organization. A case study has been carried out in a sanitary company in Chile prioritizing critical processes that could allow develop an investment policy among other benefits. We have considered five business impacts as essential to be compared for each of the eight critical processes that possesses the organization. For the critical processes prioritization expert point of views, empirical data and by applying AHP the results are released, allowing enterprise to generate an investment plan and risk mitigation.

DETERMINING ENERGY INVESTMENT DECISION WITH AHP IN AFRICA BY USING GOVERNANCE AND ELECTRICAL CONSUMPTION

Omer Aladinli, Istanbul Technical University
Abstract

In this decade, energy has gained more power and is taking now much more attention than any other decade. Currently Africa is the only country that has people getting lesser access to electricity. That lack of electricity access, attracts energy and electricity generator investors; however, shortages on governance in African countries hampers

investors. Therefore, exact and efficient planning is really important for those countries. Forecasting and projection is therefore extremely important for Africa, particularly for Sub-Saharan Region. 5 different countries were considered and for each country, at least 7 forecasts are made. The best result are taken in to account and 5 year long projection is made thereafter. During the study annual observations beginning from 1973 to 2013 are used. Moving Average, Exponential Smoothing, Holt's Method, Linear Regression, Quadratic Regression, ARIMA models including all combinations of p, d, and q changing between 0 to 2. For sure, the data include trend because technology has grown so fast that triggers consumption of electricity. Therefore, almost all time series have trend properties. In the result, ARIMA and Holt's method together is considered the best models in comparison with others as they had lower error rates. Afterwards, by using IIAG index data, a pool data has been generated in order to investigate the governance effects of each country's electricity consumption. Four main categories are determined and panel data analysis is applied. According to results of countries' effect on electricity consumption and countries' next 5 year's projection has taken into account and used as the input data for AHP in order to find the best alternative for energy investors. In the consequences part, results are interpreted by considering both investors and countries future strategies.

COMPARATIVE ANALYSIS OF AHP AND FUZZY AHP IN SUPPLIER SELECTION PROBLEM

Ririn Diar Astanti, Department of Industrial Engineering, Universitas Atma Jaya, Indonesia; The Jin Ai, Department of Industrial Engineering, Universitas Atma Jaya Yogyakarta, Indonesia; Stephanie Eka Mbolla, Department of Industrial Engineering, Universitas Atma Jaya Yogyakarta

Abstract

Appropriate supplier can lead the company to reach its competitive advantage. Many researchers have been conducting research in supplier selection problem using various multi-criteria decision making methods, including the Analytical Hierarchy Process (AHP) and its variation, such as Fuzzy AHP (FAHP). The research in this paper is trying to apply both AHP and FAHP in a glove manufacturer in order to see the role of the expert to the result of both methods. Four experts who are the staff in that company that have been working for 12-16 years are involved to see if

FAHP is still needed. The FAHP method in this paper is based on the FAHP model developed by Chang (1996).

Session Chair: Astrid Maria Oddershede, usach, Chile

SATURDAY AUGUST 6

REGISTRATION

9:00 am to 3:00 pm
Room: Atrium

KEYNOTE SPEAKER: JAMES G. DOLAN, M.D.

Plenary Session
9:00 to 10:00 am
Room: Great Western 1

COFFEE BREAK

10:00 to 10:40 am
Room: Atrium

1.4 MULTI-CRITERIA DECISION ANALYSIS THEORY AND METHODOLOGY

10:40 to 11:40 am
Room: Campanula

AHP GROUP DECISION MAKING AND CLUSTERING

Oliver Meixner, University of Natural Resources and Life Sciences Vienna; Rainer Haas, University of Natural Resources and Life Sciences Vienna; Siegfried Pöchtrager, University of Natural Resources and Life Sciences Vienna

Abstract

Within this study, we will provide a comprehensive overview over AHP group decision making. The core research goal is the systematic identification of homogenous groups which is of special interest if we have a large number of decision makers. We will present a simple but effective methodology on clustering AHP group evaluations. Within our approach no modification of AHP theory is necessary as suggested by other authors in order to identify homogenous groups of decision makers.

A METHOD WITH FEEDBACK FOR AGGREGATION OF GROUP INCOMPLETE PAIR-WISE COMPARISONS USING SCALES WITH DIFFERENT NUMBERS OF GRADES

Vitaliy V. Tsyganok, Institute for Information Recording of National Academy of Sciences of Ukraine

Abstract

A method for aggregation of expert estimates in small groups is proposed. It allows to derive priority vector based on group incomplete pair-wise comparisons and to organize feedback with experts in order to achieve agreement. Every expert is given an opportunity to use the scale, in which the degree of detail (number of points/grades) most adequately reflects this expert's competence in the issue under consideration, for every single pair comparison.

MULTI-METHOD ANALYTICAL HIERARCHICAL TECHNOLOGY FOR GROUP MULTI-ATTRIBUTE CHOICE

Alexey Petrovsky, Institute for Systems Analysis, Federal Research Center "Informatics and Control", Russian Academy of Sciences

Abstract

The paper presents a new multi-method technology PAKS-M for group choice of multi-attribute objects. The technology provides reducing the dimension of the attribute space; constructing several hierarchical systems of composite criteria and an integral quality index, which aggregate initial attributes; the classification and/or ordering of multi-attribute objects using several decision making methods. This technology significantly reduces the time and complexity of solution of multiple criteria tasks, and allows analyzing and explaining the results.

Session Chair: Oliver Meixner, University of Natural Resources and Life Sciences Vienna

6.5 BUSINESS AND INNOVATION SYSTEMS

10:40 to 11:40 am
Room: Great Western 2

AN AHP APPLICATION TO WINE EVALUATION: RATING BASED ON THE CRITERIA FRAMEWORK OF THE METHOD ADOPTED BY BRAZILIAN SOMELIERS ASSOCIATION – ABS

Flavio Antonio Maia Pinto, COPPE UFRJ Production Engineering Program - Brazil; Getulio Marques, COPPE - UFRJ - Brazil; Antonio Carlos Morim, COPPE - UFRJ - Brazil

Abstract

Wine has been related to economic and socio-cultural evolution of many civilizations. Yet, it is very difficult to determine its origin, which is believed to predate the use of writing. Since those ancient times, wine production has developed considerably, turning it into a large and complex market with a broad range of flavors, aromas and tastes, quite hard to evaluate or quantify. A wine evokes another, bringing to mind memories, however, each wine remains unique, be it for the grapes or blend of grapes, climate, type of soil, geographic region, or for the harvest. Specialists have been rating wines by tasting them and analyzing their visual, olfactory and gustatory aspects. Trade, increasingly globalized, uses scores of notable specialists to provide reference and assign a degree of prominence to the products. The objective of this study is the application of AHP methodology to evaluate and rank wines with a view to achieve greater accuracy in the process, which is based on highly subjective criteria.

ANALYSIS OF ERP IMPLEMENTATION EFFECTIVENESS OF A PLANTATION COMPANY IN INDONESIA

Fauzan Azima, Universitas Indonesia; Ratih Dyah Kusumastuti, Universitas Indonesia

Abstract

The evaluation of Enterprise Resource Planning (ERP) implementation effectiveness in a company is very important as it helps in analyzing the benefit that the company receives from the system. One of the methods that can be used to measure the effectiveness of ERP implementation is Analytical Hierarchy Process (AHP). This study aims at analyzing the effectiveness of ERP implementation at a plantation company in Indonesia by using AHP. We identify criteria that affect the implementation of ERP based on the literature and interviews with experts from the company, who also score all the criteria. The results

show that the identified criteria are strategy-fit, change management, business functionality, flexibility, and benefit. The results also show that ERP has a positive impact to the company. However, it still needs some improvement to maximize its effectiveness.

EVALUATION OF THE QUALITY OF LIFE IN THE CZECH ADMINISTRATIVE REGIONS

Josef Jablonsky, University of Economics, Czech Republic
Abstract

Measuring the quality of life of given units (cities, urban regions, countries etc.) is the task that is quite often discussed by researchers and independent organizations. The result of the analysis usually leads to a composite index that allows ranking of the units. The problem itself is multiple criteria decision analysis (MCDA) problem. This kind of problems is often solved by simple approaches that need not lead always to correct results. The main aim of the paper is to develop an AHP model with absolute measurement for evaluation of quality of life in 14 administrative regions in the Czech Republic based on 3 main groups of totally 24 criteria and compare its results with official methodology. This methodology is based on equal importance of all criteria and a quite unacceptable MCDA technique is applied. The results given by the AHP model are compared to the ones derived by official methodology, by several MCDA methods (SAW, TOPSIS, PROMETHEE), and by a data envelopment analysis model without explicit inputs.

Session Chair: Josef Jablonsky, University of Economics, Czech Republic

2.5 GOVERNMENT POLICY AND DECISION MAKING

10:40 to 11:40 am
Room: KingFisher

AHP AND DECISION MAKING ON THE USE OF CULTURAL HERITAGE IN RURAL TOURISM DEVELOPMENT IN LATVIA

Baiba Rivza, Latvia University of Agriculture
Abstract

The preservation of cultural heritage has become an important

component of government policies of the EU and, of course, Latvia. Along with the preservation of cultural heritage, the use of it is also important. The paper focuses on the problem of use of cultural heritage in developing rural tourism. The paper defined three scenarios for the use of cultural heritage in developing rural tourism. A decision on the choice of the most appropriate scenario was made based on an expert decision-making method – the Analytic Hierarchy Process (AHP).

AN APPLICATION OF AHP IN CLIMATE CHANGE MITIGATION WITH ACQUIRING RENEWABLE ENERGY TECHNOLOGIES IN NEPAL

Prabal Sapkota, Kathmandu University, Dhulikhel, Kavre, Nepal; Martina Pokharel, Freelancer
Abstract

Utilization of renewable energy resources not only generates useful energy but also aids in climate change mitigation. Energy development in Nepal has always been slow and the current generation only covers one third of the total demand. Although multiple renewable energy resources are available, due to the low economy all the types of energy systems cannot be developed together. The government seems to be perplexed in choosing the best among the alternatives as all the alternatives seems to be important and feasible. It becomes very important to prioritize them based on the peoples' need, resource availability, technical capability and environmental friendliness. Furthermore, it is also crucial to identify all the influencing actors that have major impacts on the development of energy systems in Nepal. This research identifies the most important actors, factors and alternatives which could be guidelines for the policy makers and researchers during the development of energy systems not only in Nepal but also applicable to other developing countries.

AN INTEGRATED MULTI-CRITERIA PLANNING MODEL FOR THE HYDROPOWER SURPLUS UTILIZATION IN PARAGUAY

Raúl Emilio Amarilla, Polytechnic Faculty, National University of Asuncion; Gerardo Alejandro Blanco, Polytechnic Faculty, National University of Asuncion; Aldo Martínez, Polytechnic Faculty, National University of Asuncion
Abstract

The formulation of energy policy and its evaluation planning are not an easy task. Normally, they are accomplished by considering just a techno-economic criterion. However, the scope of the analysis has evolved to a multi-criteria one due to the complexity of the issue and the requirement to assess the criteria under risk and uncertainty. The requirement to simultaneously meet multiple criteria is a current challenge for energy policy-makers that need to articulate plans according to multiple objective functions that incorporate many tradeoffs among different points of view. Under this context, this paper presents a multi-criteria decision analysis (MCDA), based on an analytic hierarchy process (AHP) model, of the sustainable use of the hydropower surplus for society's overall benefit in Paraguay. We analyze four policy options based on economic, technical, social, environmental, and political feasibility criteria. These options are: (A1) ceding the Paraguayan hydropower surplus to Brazil (business as usual - BAU); (A2) selling this surplus after 2023 at the Brazilian wholesale power market; (A3) installing an electro-intensive aluminum factory; and (A4) encouraging the development of small industrial parks with an accumulated electricity demand of 1100 MW. We find that A4 is the best option.   As energy end-use is of extreme importance in driving energy transitions, the results suggest that that A4 can generate positive spillovers for the overall society. The effectiveness of applying MCDA /AHP analysis to support policy-making for hydropower transitions in emerging economies is discussed.

Session Chair: Baiba Rivza, Latvia University of Agriculture

3.3 HEALTHCARE DECISION MAKING

10:40 to 11:40 am
Room: Redstar

EVALUATING THE RISK OF ADVERSE EVENTS IN HOSPITAL SECTOR THROUGH HYBRID MODEL AHP-DEMATEL-VIKOR METHODS

Miguel Angel Ortiz Barrios, Universidad de la Costa, Colombia; Antonella Petrillo, University of Naples "Parthenope", Italy; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Javier José Rua Muñoz, Department of Industrial Engineering, Universidad de la Costa CUC; Zulmeira Herrera Fontalvo, Department of Industrial Engineering,

Universidad de la Costa CUC; Saimon Ojeda Gutierrez, Department of Industrial Engineering, Universidad de la Costa CUC
Abstract

The aim of the present paper is to propose a hybrid model with AHP, DEMATEL and VIKOR methods to assess the risk of adverse events in a hospital. AHP has been used to determine the criteria and sub-criteria weights, and then DEMATEL (Decision Making Trial and Evaluation Laboratory) has been employed to calculate interrelations between criteria and finally, VIKOR method ranks the 3 hospitals from Healthcare Sector according to the risk of adverse events.

PRELIMINAR PRIORITIZATION OF CLINICAL VARIABLES OF THE RESPIRATORY SYSTEM OF NEONATAL PATIENTS USING THE ANALYTICAL HIERARCHY PROCESS.

Yury Estepa-Avellaneda, Student; Juan Miguel David Becerra Tobar; Diana Patricia Pedraza Alfonso, Pediatrician And Neonatologist; Luis Carlos Mendez Cordoba; Jan Bacca Rodriguez
Abstract

In this paper, we applied a Multicriteria Decisions Method (MCDM) to identify which respiratory clinical variables require urgent evaluation when a neonatal patient is being evaluated. To do so, the Analytical Hierarchy Process (AHP) was used to perform the prioritization on Silvermann-Andersen Test. .

SHOULD HEALTHCARE PROVIDERS IN THE VA HEALTHCARE SYSTEM TELECOMMUTE?

Michelle Bergman, Carlow University; Brittany Miller, Carlow University; Vida Passero, Carlow University; Enrique Mu, Carlow University, U.S.
Abstract

This paper proposal will examine, using a Stakeholder-AHP approach, the decision behind whether or not Veterans Affairs (VA) healthcare providers, namely physicians, should telecommute as part of the clinical video telehealth visit.
Session Chair: Enrique Mu, Carlow University, U.S.

1.5 MULTI-CRITERIA DECISION ANALYSIS THEORY AND METHODOLOGY

12:00 to 1:00 pm
Room: Campanula

BUILDING A VALIDATION FRAMEWORK FOR THE PRIORITY VECTOR CALCULATIONS OF A PAIRWISE COMPARISON MATRIX IN AHP/ANP

Elena Rokou, Creative Decisions Foundation
Abstract

In this paper starting from Wedley's and Choo's (2003) literature review and adding to that all the methods proposed in the literature in the last ten years, we compare the existing proposed methods for deriving a priority vector from a pairwise comparison matrix. In doing so we have a dual goal: to set up a common validation framework and to compare the existing methods against it. The validation framework consists of rules/axioms that each proposed calculation method should follow, heuristics about optional axioms, that do not need to be followed by all the methods and finally a set of numerical and rule based test cases used to compare any new method against the existing ones.

PERFORMANCE OF COMPATIBILITY INDICES FOR HIGH N VECTORS

José Leonardo da Silveira Guimarães, Regional University of Cariri; Valerio Salomon, Sao Paulo State University, Brazil
Abstract

Compatibility indices measure the level of closeness between priority vectors. This paper presents a performance assessment of three indices (Saaty's S and Garuti's G, and Salomon's V indices) for high n vectors. It found a better performance of indices S and V in relation to index G. It also reinforces assumptions of earlier studies about the sensitivity of index G to high n; and that due index V to use ordinal vectors is less sensitive than S.

CONSISTENCY & COMPATIBILITY (TWO SIDES OF THE SAME COIN)

Claudio Garuti, Fulcrum Ingenieria, Chile

Abstract

In MCDM, it is very important to have an index of consistency for pair comparison matrices. This index may help produce better metrics and of course better answers to the problem, which is the final purpose of the majority of the MCDM methods. To illustrate the relevance of this matter, this paper presents an example that takes in consideration one of the most important consistency indices in the literature, the Saaty's consistency index. Working in a way similar to reductio ad absurdum, and using the compatibility index as collaborative tool, we will show that Saaty's consistency index is in fact a good quality index.

Session Chair: Elena Rokou, Creative Decisions Foundation

INVITED SPEAKERS I

Special Session
12:00 to 1:00 pm
Room: Great Western 1

ANALYTIC HIERARCHY PROCESS TO SELECT THE SURGICAL APPROACH IN HERNIA REPAIR: LAPAROSCOPIC VERSUS OPEN SURGERY HERNIA REPAIR

Sajeevie Pinnaduwe Hewa, University of Warwick; Umberto Bracale, University Federico II of Naples; Leandro Pecchia, University of Warwick, UK
Abstract

In this study, the AHP was used to prioritise the clinical, technical and economic needs that should be considered when planning a surgery for hernia repair. Once these needs were prioritised, two different surgical techniques were compared, Laparoscopy Hernia Repair (LHR) vs Open Surgery Hernia Repair (OHR).

THE SUPPLIER SELECTION PROBLEM: THE EVOLUTION OF A QUINTESSENTIAL MULTI-CRITERIA DECISION MAKING PROBLEM

Andrea Genovese, University of Sheffield

Session Chair: Leandro Pecchia, University of Warwick, UK

6.6 BUSINESS AND INNOVATION SYSTEMS

12:00 to 1:00 pm
Room: Great Western 2

ESTIMATING SUBSCRIBERS` PERCEPTION OF BRAND EQUITY ON PURCHASE DECISION OF NIGERIAN MOBILE TELECOMMUNICATION SERVICES: AN ANALYTICAL HIERARCHY PROCESS APPROACH

Sulaimon Olanrewaju Adebiyi, Business Administration Department, Fountain University, Osogbo. Nigeria; Emmanuel Olateju Oyatoye, University of Lagos, Nigeria; Bilqis Bolanle Amole, Department of Business Administration, University of Lagos, Nigeria

Abstract

For firms that compete by providing similar services, the need to enhance brand equity in order to attract and retain customers which are the major reasons for the existence of most private firms, like mobile telecommunication companies in Nigeria cannot be overemphasized. Thus, this study estimates subscribers' perceptions of brand equity of mobile telecom service providers in Nigeria. An analytic hierarchy process model was built, involving three stages of goal (determinants of purchase decision and satisfaction with telecom services through brand equity), the criteria were brand equity dimensions while the alternatives were the sub-criteria of each the brand equity dimensions. Using a cross-sectional survey design, primary data were collected from subscribers of mobile telecom in Lagos state, Nigeria using well-structured AHP-based questionnaire. This allows for pairwise comparison of each subscriber judgments on brand equity influence on their purchase decision. Data collected were analysed and values were obtained for the consistency index and ratio, eigenvector, eigenvalue (λMax), priority weight, global rating and ranks which has practical implications on marketing and organisational strategies of the mobile telecommunication firms in particular and will positively strengthen the industry sustainable business performance at large.

SUSTAINABLE INNOVATION MULTICRITERIA INDEX (SIMI) FOR ASSESSMENT OF BIOTECHNOLOGY RESEARCH

Rafael Lima Medeiros, Federal University of Amazonas; Ranniery Mazzilly, University of Minho; Nelson Kuwahara, Federal University of Amazonas; Niomar Lins Pimenta, Federal University of Amazonas

Abstract

The general goal of this research is to draw up an index for the evaluation of the sustainable innovation potential of scientific research in the biotechnology field. The experiment consisted of the index's conceptual construction, for which the Sustainability Innovation Cube was the chosen methodology. The framework characteristics suggest the use of a multi-criteria approach to draw up the index, thus justifying the option for the Analytic Network Process (ANP). The results show that the ANP is efficient for the synthesis of the innovative sustainable performance in tests with simulated judgements; so, the methodology's validity should be tested in real case studies.

THE PRIORITIES OF SUPPLY REQUIREMENTS FOR E-LEARNING USING THE ANALYTIC HIERARCHY PROCESS

Min-Suk Yoon, Chonnam National University, Republic of Korea; Joohyun Park, Chonnam National University; Xuting Li, Chonnam National University; Jun-Suk Lee, Chonnam National University

Abstract

The topic of e-learning is gaining much attention as in this paper. The online delivery of information brings about the transition from traditional education to online learning. Related technological advances have reshaped the e-leaning landscape to cope with the various requirements, on which this paper focuses to identify key factors by prioritizing them. The e-learning requirement structure is composed of three dimensions (digital contents, web site support, software) and hierarchically specified. The analytic hierarchy process (AHP) is utilized to evaluate structured factors more accurately by pairwise comparisons. This study shows that the most impact factor is digital contents followed by software and website support in order. Using compatibility index in the AHP, this paper also shows that the priority of each factor is different by the level of usage.

Session Chair: Bolajoko Nkemdinim Dixon-Ogbechi, University of Lagos, Nigeria

2.6 GOVERNMENT POLICY AND DECISION MAKING

12:00 to 1:00 pm
Room: KingFisher

USING AHP AND DEA IN COMPARATIVE STRATEGIC ANALYSIS OF POLISH REGIONS

Jacek Strojny, Rzeszow University of Technology, Poland
Abstract

The aim of this article is to verify the possibility of implementing methods of AHP (Analytic Hierarchy Process) and DEA (Data Envelopment Analysis) for strategic analysis of regions using Poland as an example. The subject taken, fits in both the economic theory of regional development, as well as the concepts of New Public Management, public governance and theory of strategic management. All of these theoretical approaches are in the circle of economics and management science. The study is also characterized by the high potential for its implementation. The results can be used, among others, to evaluate the effectiveness of the potential usage in creating the production capacity and building attractiveness in relation to stakeholders. In describing the potential and attractiveness of the region, two models of AHP were constructed. They are: Regional Attractiveness Model (SEEGI Model) and Regional Potential Model (TCB Model). The first one takes into account criteria such as: Society, Economy, Environment, Government and Infrastructure. Attractiveness is evaluated in relation to the three groups of customers: Tourists, Citizens and Businesses. Appropriately selected statistical variables were introduced at the level of sub-criteria for both models. Evaluation of the validity of the criteria and sub-criteria were based on assessments of the experts involved in local development. The level of attractiveness and the level of potential of regions were calculated using weights of the significance of the model's components and normalized values of statistical variables. The production level in the region was measured by the GDP (Gross Domestic Product). To evaluate the effectiveness of potential the DEA method was applied. The study evaluated the effectiveness of expenditures described by criteria of the SEEGI Model in relation to the effects described by: GDP value and criteria the TCB Model.

MENTAL MODEL AND NETWORKS-BASED METHODOLOGIES FOR THE DEVELOPMENT OF AHP/ANP STRUCTURES

Luis Antonio Bojórquez-Tapia, Lancis Unam, Mexico; Bertha Hernández-Aguilar, Lancis; Alejandra Martinez, Lancis; J. Mario Siqueiros-García, Iimas-Unam

Abstract

In this article we propose a methodology based on mental models and network analyses for the identification of criteria and alternatives for AHP modeling.

SELECTION PROCESS OF MUNICIPALITIES FOR THE IMPLEMENTATION OF SENAI OPERATING UNITS USING MULTICRITERIA DECISION ANALYSIS

Giovani Gujansky, SENAI/ES; Mischel Carmen Neyra Belderrain, Instituto Tecnologico de Aeronautica

Abstract

The National Industrial Education Service ("Serviço Nacional de Aprendizagem Industrial" - SENAI) is the largest institution of technical education in Latin America. One of its guidelines is increasingly offering professional education in all states of Brazil, which in turn requires the expansion of its service network. The investment for the implementation of a new unit of SENAI is high and generates several political and management problems. Thus, the choice of the municipality for deployment should be based on clearly defined criteria and on a consistent methodology. This paper aims to choose the municipalities for the implementation of new units of SENAI in the State of Espirito Santo, Brazil. We use the Analytic Hierarchy Process Sort (AHPSort) for classification of municipalities considering an economic scenario, and the Analytic Hierarchy Process (AHP) for ranking the municipalities within the priority class for the selection.

Session Chair: Jacek Strojny, Rzeszow University of Technology, Poland

5.5 INDUSTRIAL AND MANUFACTURING ENGINEERING

12:00 to 1:00 pm
Room: Redstar

IMPROVEMENT OF OBJECT ORIENTED DESIGN QUALITY MEASUREMENT USING FUZZY AHP

Petrus Mursanto, Universitas Indonesia, Indonesia
Abstract

A new method for defining rank of quality over a number of object oriented software applications has been developed. The method is to interpret a number of metric values obtained from measuring object oriented properties of executable Java codes into a single quantitative value that represents its quality. OO metrics are treated as the multi criteria. Their values are converted to pairwise comparison matrix according to the AHP scheme. Fuzzy logic is applied to address the limitation of existing methods. It has been proved that fuzzy-AHP method results in more accurate and more consistent judgment in defining relative quality compared to AHP.

INTEGRATING ECOSYSTEM SERVICES INTO INDUSTRIAL LOCATION STUDIES: A FUZZY HIERARCHIC APPROACH

Guilherme Weber Martins, UFRJ; Carlos Alberto Nunes Cosenza, UFRJ; Getulio Marques, COPPE - UFRJ - Brazil
Abstract

We propose an approach based on Fuzzy Logic and structured Hierarchy Analysis for integrating ecosystem services into industrial location studies. For such, we adopt the concept of ecosystem services (ES) defined by the Millennium Ecosystem Assessment (MEA). Although studies considering ES in land use decisions exist, few are those, which exploit them as industrial location factors. In this role, ES may be understood as benefits industries obtain from regional ecosystems candidates for location. However, use of ES by industries may cause impacts (costs) of diverse nature and intensity on ecosystems. Of complex valuation in quantitative absolute terms, these benefits and costs may be estimated in relative terms, respectively, by the relative dependence of industries on ES availability in the regions, and by the

relative impacts of industries on regional ecosystems, all according to the perception of experts. The framework proposed here utilizes this relative evaluation to integrate ES into locational studies.

INTEGRATING SUSTAINABILITY AND MANUFACTURING STRATEGY IN A UNIFIED FRAMEWORK

Eppie Estanislao Clark, De La Salle University
Abstract

The direction of current literature in addressing sustainability issues in the manufacturing sector highlights some models and approaches that are usually based on the concept of the triple-bottom line. However, as a functional unit, the role of the manufacturing function in promoting competitiveness has been surpassed by the current demands of sustainability such that desired integration has been difficult to attain. This paper proposes a unifying framework in formulating a manufacturing strategy which espouses sustainability with due consideration of the manufacturing internal and external competitive functions. The proposed framework integrates the features based on the classical theories of manufacturing strategy and the other features that must be considered to transform it into a sustainable manufacturing strategy. This framework serves as a guide for decision-makers in identifying policies in various manufacturing decision areas that would comprise a sustainable manufacturing strategy. Multi-criteria decision-making (MCDM) approaches were found to be relevant and appropriate due to the complexity of the strategy formulation problem brought about by the subjectivity, interdependencies of decision components and vagueness in decision-making. A probabilistic fuzzy analytic network process (PROFUZANP) was adopted to identify the content of the strategy. Results of recent empirical studies that are based on the models generated from the framework are presented in this paper.
Session Chair: Petrus Mursanto, Universitas Indonesia, Indonesia

LUNCH & POSTER SESSION 2

1:00 to 2:30 pm
Room: Atrium

POSTER SESSION 2

EXOGENEITY TEST AND ITS APPLICATION IN ANALYSIS OF RELATIONSHIPS OF FORWARD AND SPOT EXCHANGE RATES

Josef Arlt, University of Economics Prague; Martin Mandel, University of Economics Prague; Markéta Arltová, University of Economics Prague
Abstract

The forward rate unbiasedness hypothesis says that the time series of the future spot exchange rate depends on the time series of today quoted forward exchange rate. Expectation hypothesis in the forward rates means that the time series of today quoted forward exchange rate depends on today expected future spot exchange rate. To test these hypotheses the innovative econometric procedure based on testing cointegration and weak exogeneity was proposed. The forward rate unbiasedness hypothesis respectively the expectation hypothesis can be formulated as the hypothesis of weak exogeneity of the forward rate with respect to the parameters of conditional error correction model for the change of the future spot rate, respectively as the hypothesis of weak exogeneity of the future spot rate with respect to the parameters of conditional error correction model for the change of the exchange rate. The weak exogeneity means that the relationship of the analysed time series can be seen as one sided where one variable has a character of condition and the second one of consequence which follows from the condition. From the empirical analysis made on the basis of data from the Czech Republic it follows that the forward exchange rate does not act as an unbiased estimate of future spot exchange rates. Instead, the expectation hypothesis that the time series of forward exchange rate depends on expected future spot exchange rate can be considered as accepted. But the long-run relationship promotes very weakly. This paper was written with the support of the Czech Science Foundation project No. P402/12/G097 DYME - Dynamic Models in Economics.

PRIORITIZING SERVICE QUALITY MEASUREMENT CRITERIA IN CHARTER BUS TRANSPORTATION SERVICES WITH AHP

Andrey Pelicer Tarichi, University Center of Araraquara -UNIARA; Leandro Cocato Fernandes, University Center of Araraquara - UNIARA; Claudio Luis Piratelli, University Center of Araraquara -UNIARA; Creusa Sayuri Tahara Amaral, University Center of Araraquara -UNIARA

Abstract

The aim of this study is to prioritize and compare the expected criteria which how clients and the business manager assess the quality of charter bus transportation service in a Brazilian transport company. To reach the goal, surveys were conducted in groups of passengers and the business manager of a charter transportation service company using a combined model based on the SERVQUAL and the Analytic Hierarchy Process Model (AHP). Representative samplings of passengers and manager were interviewed during August of 2014 and data was analyzed using the Superdecisions® software. By the pairwise comparison, it was possible to find out the global weights of the passengers´ expectations of the service criteria and the manager´s perception of such expectations. The SERVQUAL "Gaps 1" among the priorities and ranking positions pointed out criteria that the company should prioritize. The results allowed us to conclude that combining AHP with SERVQUAL provides a powerful quality management tool for decision-making and matching the clients´ needs at the company analyzed.

MANAGEMENT OF CAPITAL INVESTMENT PROJECTS – USING AHP/ANP FOR THE PRIORITIZATION OF CRITICAL SUCCESS FACTORS

Constantin Schnupp, University of St. Gallen (CH)

Abstract

Management of capital investment projects (CIP) is of vital relevance for corporations since successful CIPs may lead to strategic or operational benefits, while failed investments entail value destruction. Therefore, long-term corporate performance is highly affected by CIPs. Capital investments and related decisions are of high complexity since they are characterized by irreversibility, uncertainty, and the involvement of significant amounts of capital. However, despite the utmost relevance of CIPs, a myriad of these projects are not considered successful. A literature review shows that past capital investment research mainly focusses on

the appraisal and decision phase of CIPs. Thereby, it is disregarded that failures during project implementation also may jeopardize project success and eventually destroy value. Therefore, this study concentrates on the implementation phase and addresses the question of how management of CIPs can be improved to increase the likelihood of project management success. To do so, the study builds on critical success factors (CSF), since within research on project success the identification of CSFs is the most widely applied approach. The study's objective is to develop an analytical process for the prioritization of CSFs to support project management and investment control. In a first step, the project management's success criteria are determined and a long list of potentially relevant CSFs is compiled by literature review and interviews. Secondly, CSFs are prioritized with respect to the defined success criteria by applying AHP/ANP to collect in-house expert's opinions. By applying this process, the often universalistic applied CSF approach is customized by considering contingencies, e.g., project characteristics. Further, it is assured that the number of CSFs is reduced to a manageable amount. Consequently, the study contributes both to practice and research since the prioritization process which is demonstrated in case studies does not only support decision-makers, but also addresses research gaps in project management literature.

SCENARIOS OF TERRITORIAL TRANSFORMATION OF AN ITALIAN ALPINE AREA: THE PROVINCE OF BELLUNO

Giovanni Campeol, University IUAV of Venice; Sandra Carollo, Studio ALIA; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Nicola Masotto, University of Padua; Antonella Petrillo, University of Naples "Parthenope", Italy; Giuseppe Stellin, University of Padua, Italy
Abstract

The Italian Alpine region is characterised by a social and economic structure that has its main source of wealth in the cross-border traffic roads. The only region that does not have a mountain motorway pass is Veneto, whose northern border is represented by the province of Belluno, a real cul-de-sac between Trentino Alto Adige and Friuli Venezia Giulia regions. In spite of this "communication obstruction" towards Europe, the territory of the province of Belluno has developed in time a strong manufacturing industry such as the eyewear district, which is a worldwide excellence. However, globalisation processes are

progressively undermining the economic model developed in this province due to the absence of a road transport infrastructure allowing it to rapidly connect to Europe and its markets. Several strategies were proposed in the past and others have been presented nowadays, with the goal of developing the social and economic system as well as improving the accessibility to the territories in the province of Belluno. This study considers the main development proposals presented to date, from which it is possible to deduce the characteristics of the transport scenarios "projects". These may be submitted to the environmental evaluation through the AHP (Analytic Hierarchy Process) method. For this contribution several projects (railways and roads) have been analysed, among which also the hypothesis to build an important road infrastructure with direct access to the North, in Austria. The AHP evaluation approach is in this research a crucial contribution to decision-making, for choosing the best strategies to adopt in favour of the territory, which is the most performing "project scenario" for the social and economic development of the Belluno province.

THE BIGGEST THREAT FACING MIDDLE EAST

Heba Adbulwasea Gogandy, King Abdul-Aziz University; Lamees Muhammad Alhashimi, King Abdulaziz University; Khadija Mughrbil, King Abdul-Aziz University; Asma M Bahurmoz, King Abdulaziz University, Saudi Arabia

Abstract

Currently, the Middle East and North Africa (MENA) is a region filled with conflict and instability. Civil wars, religious sectarianism, and water scarcity are only a few of many threats facing the region. It is important to identify and prioritize these threats to be able to deal with them, starting from the most dangerous and so on. Unfortunately, this task is much harder in practice because of the lack of information or misinformation that is rampant in the region, and the strong desire of some to keep the status quo. The objective of this paper is to attempt to identify the biggest threat that faces the MENA region using the Analytic Hierarchy process (AHP). Information, including political and economic analysis of countries in the region, disaster reports, and general information and statistics about the region, is gathered to develop a hierarchical structure of the selection criteria and different threats as alternatives. The computer software Super Decisions is used to aid in the

implementation of the AHP process. Finally, the biggest threat that is expected to have the greatest impact on the MENA region is identified

KEYNOTE SPEAKER: EDGARDO IOZIA

Plenary Session
2:30 to 3:30 pm
Room: Great Western 1

COFFEE BREAK

3:30 to 4:00 pm
Room: Atrium

1.6 MULTI-CRITERIA DECISION ANALYSIS THEORY AND METHODOLOGY

4:00 to 5:00 pm
Room: Campanula

A MEASUREMENT OF AGREEMENT AMONG JUDGES FROM DIFFERENT BACKGROUNDS IN ANALYTIC HIERARCHY PROCESS

Indrani Basak, Penn State Altoona
Abstract

In Analytic Hierarchy Process (AHP), decision on priorities of alternatives is made based on judgments from a group of individuals. Often these groups are of different backgrounds (social, geographical or gender) and it is of interest to see whether these different backgrounds create any difference in their prioritization of the alternatives in the decision problem. In this article, we develop a categorical data methodology to measure the level of agreement among groups from different backgrounds regarding their priorities on a fixed set of alternatives.

VOTING THEORY AND PAIRWISE COMPARISON MATRICES

Takafumi Mizuno, Meijo University, Japan; Kouichi Taji, Nagoya University
Abstract

Borda's rule is an election method which is substitute for majority voting.

The method was designed by Borda to overcome a defect of majority voting. First, we introduce Borda's rule, in which each voter votes his/her preference order of alternatives, and each alternative obtains scores corresponding to its ranks. Next, we formulate the voting results as a pairwise comparison matrix, from which we show that there is a very close similarity between Borda's rule and eigenvector method in AHP.

AHP METHOD OF DETERMINATION OF RELATIVE WEIGHTS FOR JUDGED ITEMS AND JUDGES IN A JUDGEMENT PROCESS

Alexandre Souza Girão, Sebastião Girão Rocha and Zaide Souza Girão
Abstract

The aim of this paper is to propose an alternative method to assist judgement processes. This method is based on the creation and conjugated usage of relative degrees of importance (weight) of the judged items and the relative degree of importance (weight) of the judges. The score given by the judge to the item will be influenced by these two weights. The relative weights of the judged items are defined by specialists. The relative weights of the judges are defined by specific qualification criteria. It is paramount to consider these two factors in a judgement process using reliable metrics and parameters. The intention is to make the final result of a judgement, with respect to the judged items, have a greater representation in reality. This methodology can, at first, be used in any judgement process. The methodology uses descriptive and exploratory researches.

Session Chair: Claudio Garuti, Fulcrum Ingenieria, Chile

6.7 BUSINESS AND INNOVATION SYSTEMS

4:00 to 5:00 pm
Room: Great Western 2

ANALYSIS OF IMPROVEMENT ELEMENTS OF WALKING ENVIRONMENT ON KOREA TRADITIONAL MARKETS USING AHP

Kumho Chung, Department of Architecture, Chonnam National University, South Korea; Min-Suk Yoon, Chonnam National University,

Republic of Korea

Abstract

In this paper we deal with elements for ambulatory improvement to activate traditional markets in South Korea.   The object of this study is to analysis the priority of elements of walking space on traditional market using AHP. This paper used two level hierarchy structure to achieve the object, first level was composited with 4 elements and second level was composited with 28 elements. The questionnaire were made pairwise comparison. The data for analysis was taken through a survey for university students. AHP process leaded the results of this study as follow. First, the order of element priority is interest, convenience, comfort and safety. Second, the order of elements to improve traditional markets on Korea are pitchman, street vendors, shopping, price negotiation, paving, landscape, street light, benches, people, bins, street trees, obstacle, information signs, illegal parking, close to the road, nosy, sidewalk width, hustle and bustle, cut off the sidewalk, sidewalk slope, meeting, public transport, traffic, pedestrian, stalls, billboards, vehicle speed, parking lots, humps, and bicycle roads.

ESTABLISHING A MULTI-CRITERIA EVALUATION STRUCTURE FOR DEVELOPMENT TOURISM STRATEGIES: THE CASE OF CARTAGENA

Hannia Karime González-Urango, Universitat Politecnica de Valencia; Monica Garcia-Melon, Universitat Politecnica de Valencia, Spain

Abstract

Cartagena de Indias, is one of the most representative cities of Colombia, its tourist attractions and its infrastructure, make it one of the most important tourist destinations in the Caribbean. Tourism is therefore one of the main motors of the economy, recognized by locals as the leader in job creation for the city, generating significant economic and social impact. In this work, we will propose a methodology, which seeks to answer the question of what is the most suitable strategy to improve tourism in Cartagena de Indias? Since the selection of a tourism strategy is a multicriteria decision by nature, we will apply the AHP methodology to solve it. We will also work with the participation of experts from different economic and social sectors. Since this prioritization process is key to the strategic planning of the city.

APPLICATION OF THE AHP IN ANALYSING DECISION MAKING PROCESS IN PROJECTS: CASE STUDY OF A MAJOR PROJECT DECISION

Ramesh Vahidi, Business School, Southampton University
Abstract

This paper focuses on a special application of the AHP for retrospective analysis of a critical project decision using real data from an infrastructure project. Modelling and analyzing the decision with the AHP were conducted through a case study as part of a comprehensive research on project major decisions. The AHP facilitated analysis of the quality of 'decision making (DM) process' in terms of decision makers' (DMks') biases, their level of compliance and engagement with project objectives and quality of communication during DM. Various features of Comparion Core software were used to facilitate problem analysis. Unlike many applications of the AHP in project management (PM), it was used in its full capacity with a focus on analyzing the DM 'process' rather than a peripheral method to generate input for other DM methods.

Session Chair: Monica Garcia-Melon, Universitat Politecnica de Valencia, Spain

4.1 APPLICATIONS IN CIVIL ENGINEERING AND URBAN MANAGEMENT
4:00 to 5:00 pm
Room: KingFisher

RATING THE ACTION PROGRAMMES FOR FLOOD PREVENTION WITH AHP-ANP MODELS: AN EVALUATION OF COLLECTIVE PREVENTION EFFORT

Flora Guillier, University od eastern Paris
Abstract

664 Million EUR related to flood damages is compensated each year in average.   To take in account collective prevention's efficiency to reduce damages on territories, this research project aims to experiment a national rating system of collective prevention actions through expert valuation. Action Programmes for Flood Prevention (PAPI) are the one

key public policy instrument to manage flood risk in France. To score collective prevention through PAPI, we propose an original use of AHP-ANP models to weight the different categories of actions that PAPI can mobilize, with the contribution of representatives of all flood risk stakeholders.

TSUNAMI EVACUATION SIMULATION WITH MULTI-AGENTS AND DECISION MAKING ON A COUNTERMEASURE WITH AHP

Kazuhiro Kohara, Chiba Institute of Technology, Japan; Takuya Sugiyama, Chiba Institute of Technology
Abstract

We propose an integration method that uses the analytic hierarchy process (AHP) and agent-based modeling to simulate tsunami evacuation and to make decision on a countermeasure. First, we create multiagent coast models that include a tsunami agent, shelter agents, road agents and evacuee agents. We then estimate the evacuation success/failure number by using a computer simulation based on multiagent coast models. Finally, we use AHP to determine the countermeasure against tsunami disaster.

A SURVEY OF AHP AND ANP APPLICATIONS IN CIVIL ENGINEERING AND URBAN MANAGEMENT

Grzegorz Ginda, AGH University of Science and Technology, Poland; Miroslaw Dytczak, AGH University of Science and Technology, Poland
Abstract

Results of a survey of scientific works which deal with the application of AHP and ANP in civil engineering and urban management are presented in the paper. Dozens of books, journal articles, chapters in monographs and papers included in conference proceedings have been analysed. The survey delivers information about decision making problems in civil engineering and urban management solved by means of AHP and ANP. It also documents development of ways the techniques are applied to improve solutions of problems in both fields.

Session Chair: Kazuhiro Kohara, Chiba Institute of Technology, Japan

5.6 INDUSTRIAL AND MANUFACTURING ENGINEERING

4:00 to 5:00 pm
Room: Redstar

APPLYING AN ANALYTIC HIERARCHY PROCESS TO CREATE A NEW MEASURE OF FUEL POVERTY

Robert Marchand, University of Sheffield; Lenny Koh, University of Sheffield; Andrea Genovese, University of Sheffield; Alan Brennan, University of Sheffield
Abstract

Fuel poverty affects 4.5 million homes in the UK and is receiving increasing attention internationally. It has significant health, economic and social impacts, yet less than 25% of expenditure on fuel poverty reaches fuel poor homes in the UK. Current measures maintain a technical view of the issue, rejecting social factors. This paper implements an Analytic Hierarchy Process to weight qualitatively obtained social practice factors of fuel poverty in the UK. It identifies 27 social practice factors nested in four tiers that contribute to the existence of fuel poverty in the UK. It marks the first attempt to quantify social practice factors of fuel poverty. It provides a methodological approach that can be applied internationally, to incorporate qualitative evidence in a quantifiable policy model for use in citizen centred policy making which aids in the identification of novel sites for policy intervention.

CLARITY OF VIEW: AN AHP BASED EVALUATION FRAMEWORK FOR DRIVER AWARENESS SYSTEMS IN HEAVY VEHICLES

Dee Wood Kivett, Clemson University
Abstract

One of the most difficult aspects of any new human-machine interface development is that of evaluating the user's subjective reaction to the system.   In some cases, fears about the usability of a new technology may actually prevent it from being approved for use due to the perception of potential risk.   This is especially true in the automotive industry where driver interface design directly affects safety.   In this

case study, a new evaluation framework is presented: Clarity of View – An evaluation framework for 360 degree awareness systems in heavy vehicles. This evaluation framework is developed to incorporate both the results of the industry-published methods for evaluating a rearview vision system and combine with it additional new factors that contain both subjective perception and quantitative elements. This evaluation framework utilizes advanced decision modeling techniques that are based on the Analytic Hierarchy Process.   It is more closely aligned with the actual decision making process of fleet owners in the trucking industry who are often bombarded with information about potential new safety technology for their fleets, but may otherwise have had a difficult time sorting through the many dissimilar elements of information. This case study serves as a potential model not only for other driver interface systems within the automotive industry, but for any industry that needs to consider both quantitative measures alongside subjective user perception in order to make a fully informed technology selection decisions.

A PERFORMANCE MEASUREMENT MODEL FOR MANUFACTURING COMPANIES TO DETERMINE THEIR STRENGTHS AND WEAKNESSES IN CRITICAL ACTIVITIES

Mustafa Yurdakul, Gazi University; Yusuf Tansel Ic, Baskent University
Abstract

This paper aims to develop a comprehensive performance measurement model, which not only determines a manufacturing company's overall performance among in its industry but also obtains its strengths and weaknesses in various critical activities (areas). The proposed model has a hierarchical structure, which lets one to combine a company's performance level in critical areas with important industry-specific objectives and obtain a single overall performance score. On the other hand, the comparison of a company's performance in critical areas and objectives with respect to its competitors indicates the areas that should be improved in a quality improvement program.

Session Chair: Andrea Genovese, University of Sheffield

1.7 MULTI-CRITERIA DECISION ANALYSIS THEORY AND METHODOLOGY

5:15 to 6:15 pm
Room: Campanula

EDUCATIONAL PROJECTS AS INTAGIBLES' RESOURCE ALLOCATION: AN AHP APPROACH

Andrei Răduțu, Bucharest University of Economic Studies; Adriana Agapie, Bucharest University of Economic Studies, Romania
Abstract

The decisional making process was used in this paper for underlining the importance of the process of resource allocation in a student organization (NGO). By elaborating a decisional model using AHP and by having the specialized knowledge of educational experts, the projects and initiatives taken into consideration were optimally chosen, by individual questioning, the results being the same in each case. Thus, the decisional model is being perceived as a sustainable system of decision-making.

THE IDENTIFCATION OF ADEQUATE CONTROL STRUCTURE FOR AHP AND ANP

Grzegorz Ginda, AGH University of Science and Technology, Poland; Miroslaw Dytczak, AGH University of Science and Technology, Poland; Barbara Jastrząbek, University of Bielsko-Biala, Faculty of Materials, Civil and Environmental Engineering
Abstract

The reliability of AHP and ANP analysis results depends on the application of a structure that adequately describes relations between a decision problem model components. Model structure adequacy is especially important in the case of modeling complex systems with possible dependence and feedback between their components. But even in the case of problems related to complex systems structures of their models are usually constructed in a rather subjective manner. The structures are also often simplified to facilitate analysis of the systems. Fortunately, there are also decision making problem model structuring techniques

available which make finding an adequate system model structure possible in a less subjective manner. The paper deals with their application to provide adequate AHP and ANP control structures while solving decision making problems.

A NEW INTIUTIONISTIC INTEGRATED APROACH WITH FUZZY AHP AND FUZZY MOORA

Kumru Didem Atalay, Baskent University; Gülin Feryal Can, Baskent University; Betül Cansu Özçakmak, Tübitak
Abstract

This paper proposes a new integrated intuitionistic model consisting of Fuzzy AHP and Fuzzy MOORA methods to deal with the uncertainty in decision-making problems. The proposed model is implemented selection of new product alternatives for one of the biggest firms in the beverage industry. As a result of the study, the ranking of the new product alternative is determined and presented to the firm.

Session Chair: Grzegorz Ginda, AGH University of Science and Technology, Poland

6.8 BUSINESS AND INNOVATION SYSTEMS

5:15 to 6:15 pm
Room: Great Western 2

EVALUATION OF CUSTOMER RELATIONSHIP MANAGEMENT (CRM) SYSTEMS USING AN AHP APPROACH

Shannon Agredo, Carlow University; Catherine Vella, Carlow University; Enrique Mu, Carlow University, U.S.
Abstract

This study will use an analytic hierarchy approach toward the evaluation of a suitable CRM system. Although the evaluation will be done within the context of a specific business, the analysis will be done in a way that this model and our cost-benefit analysis can be useful as a learning and reference tool for other CRM decision-makers.

IDENTIFYING R&D SUCCESS PARTNERSHIP FOR NEPALESE UNIVERSITIES USING ANALYTIC HIERARCHY PROCESS

Madhav Prasad Pandey, Kathmandu University, Dhulikhel, Kavre, Nepal; Prabal Sapkota, Kathmandu University, Dhulikhel, Kavre, Nepal

Abstract

Nepalese universities have been practicing collaborative activities in the recent time with multiple agencies ranging from industries to universities both at national and international level. The current focus of the institutions seems to be only on maximizing the number of collaboration rather than focusing on the core competency. Because of this, institutions are found to be diverting from their core values, the institutional growth in the key area is stagnant, and the research activities conducted at the institutions are not producing tangible results. Experts from the research and development units of the institutions believe that there should be proper strategic path regarding partnership selection. While developing strategy, there is a need of consideration of multiple factors associated with excellence in several key areas along with multiple alternatives. AHP has been used in this research to identify best alternative for partnership along with most important factor.

MARKETING MIX STRATEGY MODEL FOR SMALL BUSINESSES IN KERALA USING ANP

Salwa CH, Research Scholar; T RADHA RAMANAN, Assistant Professor

Abstract

In today's competitive world for small business to sustain in the market it is essential to devise and implement a clear marketing strategy that helps it to compete in the market. Majority of the small businesses in India do not sustain for more than two years and they fail mainly because of strategic bewilderment. But there are business units who endure the fierce competition in the market and sustain longer even with the limited resources they have. The paper is an attempt to develop a strategic marketing model of the successful small businesses in the state and to devise a marketing mix strategy using Analytical Network Process (ANP).

Session Chair: Enrique Mu, Carlow University, U.S.

4.2 INTEGRATED APPROACHES USING AHP/ANP: INSIGHTS AND FUTURE DIRECTIONS OF RESEARCH

Special Session
5:15 to 6:15 pm
Room: KingFisher

ANALYTIC HIERARCHY PROCESS AND CHOQUET INTEGRAL COMBINED WITHIN NON ADDITITIVE ROBUST ORDINAL REGRESSION FOR THE SELECTION OF SOCIAL HOUSING INITIATIVES

Francesca Abastante, Politecnico of Torino; Salvatore Corrente, University of Catania; Salvatore Greco, University of Catania; Alessio Ishizaka, University of Portsmouth, U.K.; Isabella Lami, Politecnico of Torino

Abstract

The study develops an integrated approach for resource allocation in Social Housing (SH) initiatives in Italy. The demand for SH has emerged all over Europe and it is exponentially increasing. The Choquet integral is the most well-known and most used MCDA methodology taking into account interactions between criteria even if it shows two main problems: 1) the necessity to determine a capacity that assigns a weight not only to all single criteria but also to all subsets of criteria; 2) the necessity to express on the same scale evaluations on different criteria. This research aims to test an innovative MCDA framework for an urban problem. To handle the first problem (section 2) we adopt the recently introduced Non Additive Robust Ordinal Regression (Angilella et al., 2010) that takes into account all the capacities compatible with the indirect preference information provided by the DM. With respect to the second problem, we adopt a recent proposal to use the AHP to build the common scale on which the evaluations have to be expressed. We involved in the process real DMs, who granted access to restricted data, thus enhancing the reliability of the results. The case study concerns the simulation of a process aimed to select interventions of adjustment for properties envisaging a housing supply for "weak" segments of the population in Turin. The proposed framework seems promising, in particular because of the presence of a certain number of interacting criteria and of a high number of alternatives.

INTEGRATING COLLABORATIVE PROBLEM STRUCTURING TECHNIQUES AND THE ANALYTIC HIERARCHY PROCESS: THE CASE OF THE NEW REGIONAL TRANSPORTATION PLAN FOR 2050 IN THE PIEDMONT REGION

Maurizio Arnone, SiTI; Cristiana Botta, SiTI; Valentina Ferretti, London School of Economics and Political Science; Marco Valle, SiTI

Abstract

Scientific research has demonstrated that the identification of fundamental objectives is not an easy task and that without support people are often aware of only half of the objectives that turn out to be relevant to them (Bond et al., 2008). The research question driving this study is: "how to integrate value-focused thinking and the AHP for public policy making?". There is an increasing interest towards the use of problem structuring methods for the generation of objectives. This work experiments the use of Keeney's devices (Keeney, 1992) in the problem structuring phase of the AHP. The objective of the study is to support the Piedmont Regional Authority in the identification and prioritization of the relevant objectives for the new Regional Transportation Plan for 2050. The process consisted in the development of three subsequent focus groups with real actors, all with different competencies and backgrounds, from the Transportation Directorate of the Regional Authority. A facilitated modelling approach has been used allowing for real time discussion of the results. Given the limited availability of economic resources, the AHP has been used to draw recommendation for the development and prioritization of strategic actions within the new Plan. The high number of pairwise comparison questions has been dealt with by proposing to the actors only the subset of strictly necessary questions. The main contribution stems from the development of an effective collaborative framework which allowed to overcome heterogeneity of points of view and foster an active contribution of the participants.

ENVIRONMENTAL IMPACT ASSESSMENT FOR TALL BUILDINGS: THE APPLICATION OF THE ANP FOR A NEW LANDMARK IN THE CITY OF TURIN (ITALY)

Valentina Ferretti, London School of Economics and Political Science; Giulio Mondini, SiTI

Abstract

New urban landscapes are being shaped and a particularly interesting area of interdisciplinary research is the one concerning skyscrapers projects. The research question for this study is "Which is the role of the ANP in the context of sustainability assessment of urban transformation processes?" There is a growing interest in the development of integrated approaches for supporting public decision making processes (Bottero et al., 2014). The study aims to investigate how the ANP can shape the decision process and support in the identification of the opportunities and the risks that a territorial transformation such as the construction of a skyscraper can create. This paper describes the development of a real decision-making process related to the construction of a new skyscraper in the city of Torino (Italy). The work makes use of a focus group of experts for structuring the problem and eliciting preference information. This paper proposes and tests the development of a BOCR-ANP analysis for a complex territorial transformation involving the construction of a new skyscraper in the city of Torino (Italy). A limitation of the study is the high number of questions that the experts involved in the focus group had to answer. To reduce the cognitive burden on the experts we selected a subset of key questions from which to derive the remaining answers. The results of the study highlight the relationship between the strategic assessment procedure and the participatory planning process that has been carried out.

Session Organizer: Valentina Ferretti, London School of Economics and Political Science

5.7 INDUSTRIAL AND MANUFACTURING ENGINEERING

5:15 to 6:15 pm
Room: Redstar

SIMULATION OF AHP METHOD

Abel Zacarias, Universidade Mandume Ya Ndemufayo - Angola
Abstract

It is intended to equip the ISPH the Computing Laboratory. To this end, three competing suppliers of computer equipment, among them the

NCR, SISTEC, CINFOTEC and Office-One. It is known however that only a supplier can be selected, taking the criteria: price, quality and strength-equipment. As for the price, the amount charged by equipping for each supplier company is: NCR = $ 9,000.00, SISTEC = $ 10,500.00, $ 10,000.00 and CINFOTEC = Office-One = $ 8,000.00.

THE INFLUENCE OF TECHNOLOGY AND RISK MANAGEMENT IN THE STRATEGIC ALIGNMENT OF A PORT SYSTEM

Juan M. Sepulveda, University Of Santiago Of Chile; Claudia A. Duran, University Of Santiago Of Chile
Abstract

This paper presents an ANP model for determining the influence of technology, risk management, and the relationships of actors participating in the operation of a public-private port system. The model is applied to the case of a medium size port community having several actors performing specific roles expressed in their strategic missions. With the aid of the model, it is possible to find dominant actors and criteria, which allow to establish a core of actors and strategic priorities contributing to the global synergy.

RANKING OF ENTERPRISES WITH REGARD TO INDUSTRIAL MATURITY LEVEL USING AHP AND TOPSIS

Zoran Babic, University of Split, Faculty of Economics; Ivica Veza, University of Split, Faculty of Electrical-, Mechanical Engineering and naval Architecture; Ivan Pavic, University of Split, Faculty of Economics
Abstract

The project Innovative Smart Enterprise INSENT wants to improve the scientific understanding of average Croatian manufacturing enterprises by promoting empirical enterprise-level research on technological and non-technological processes and organizational innovation. It will help develop a regional model of innovative smart enterprise based, not just on state-of-the-art theoretical models, but also on state-of-the-art practical models like Lean Management philosophy from Toyota Production System. Evaluation of industrial maturity level research is carried out using web questionnaires and interviews with 38 CEOs (chief executive officer) of manufacturing enterprises. The problem of industrial

enterprises evaluation is solved by a model that combines Analytical Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS).

Session Chair: Juan M. Sepulveda, University Of Santiago Of Chile

SOCIAL NETWORKING EVENT

6:30 to 11:30 pm

Sightseeing Bus Tour and Dinner at the Dickens Inn, one of the most famous and most successful pubs on The River Thames loved by locals and tourists alike.

SUNDAY AUGUST 7

KEYNOTE SPEAKER: PRASANTA KUMAR DEY

Plenary Session
9:00 to 10:00 am
Room: Great Western 1

COFFEE BREAK

10:00 to 10:40 am
Room: Atrium

1.8 MULTI-CRITERIA DECISION ANALYSIS THEORY AND METHODOLOGY

10:40 to 11:40 am
Room: Campanula

HOW TO WRITE A CONTRACT WITH THE AHP

Luis G Vargas, University of Pittsburgh, U.S.; Ami Arbel, School of Engineering at Tel Aviv University, Israel
Abstract

In this paper we show how the Analytic Hierarchy Process could be used to develop a legal contract in the process of a negotiation. We illustrate the process with a well-known case used routinely in negotiation courses. We show that the AHP is particularly well suited for this type of applications where most of the dimensions and criteria are intangibles, and the scales used to measure the gains and costs of parties involved in the negotiation do not always exist.

WEIGHTED AVERAGE VS TOPSIS: A COMPARISON OF AGGREGATION METHODOLOGIES FOR AHP

Giuseppe Bruno, University of Naples "Federico II"; Francesco Ciardiello, University of Sheffield; Andrea Genovese, University of Sheffield; Carmela

Piccolo, University of Naples "Federico II"
Abstract

Starting from the observation of an ever increasing number of publications in the field of supplier selection problems utilising multi-criteria decision making methodologies, this paper aims at providing a critical comparison of some of the most utilised approaches in this context. The goal of this paper is to provide a structured comparison of two of the most popular methodologies employed in combination with the Analytic Hierarchic Process (AHP) in solving supplier selection and similar multi-criteria decision making problems: the Weighted Average and TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) (Lima et al., 2014). In particular, we compare the performance of these two aggregation methodologies on the basis of a set of randomly generated numerical instances of a hypothetical supplier selection problem. Supplier rankings will be produced by employing AHP in combination with TOPSIS and Weighted Average techniques; concordances and discrepancies of the resulting rankings obtained by using the different methodologies will be evaluated according to appropriate statistical measurements and tests. A discussion about practical implications of the study will be then developed, along with conclusions and future research perspectives.

NEW PRIORITY CALCULATIONS

William Adams, Decision Lens Incorporated, U.S.
Abstract

There are many methods of deriving priority vectors from pairwise comparison matrices, e.g. the standard largest eigenvector, the geometric mean, Harker's method, the least squares method, etc. Through our work on the Sim- pleAHP web application, we discovered an issue with most of these methods, that confused our users. The issue arises when there are two or more voters on a particular pairwise set, and those users have opposite votes on everything (we call them doppleganger voters). Given doppleganger voters one would expect the resulting priority sets to be inverses, or at least have reversed rankings. This is not always the case (this result has long been known, but the SimpleAHP web application made this idea more apparent). While the geometric mean method does address this issue, it has its own shortcomings. Therefore in this paper we describe two new priority vector calculations that address doppleganger

voters, while retaining the graph theo- retic spirit of the eigenvector method. We compare and contrast the results of the priority calculations with some of the standard methods (eigenvector and geoemtric mean) on some differentiating examples. In addition we provide open source implementations of the new calculations in several languages (Python, R, Excel) in a free available github repository.

Session Chair: Luis G Vargas, University of Pittsburgh, U.S.

6.9 BUSINESS AND INNOVATION SYSTEMS

10:40 to 11:40 am
Room: Great Western 2

MEASURING SCHOLARSHIP IDENTITY CONGRUENCE IN HIGHER EDUCATION INSTITUTIONS: A MULTICRITERIA APPROACH

Milagros Pereyra, University of Pittsburgh, U.S.; Enrique Mu, Carlow University, U.S.
Abstract

Faculty scholarship preferences, such as scholarship of discovery, application, integration, teaching and engagement constitute a set of values, rather a source of scholarship identity for academics. However, Higher-Ed Institutions have their own expectations in terms of what type of scholarship should be given priority. Finally, environmental circumstances (e.g. accreditation efforts, faculty turnover, institutional consulting contracts) lead faculty to focus their work in areas (e.g. teaching) that may not be congruent either with faculty or institutions' priorities. Research suggests that when there is congruence in the priority given to the different types of scholarship as well as in the actual work focus, there will be higher faculty productivity and job satisfaction. Therefore, it is important to measure the priority that faculty and institutions give to the different types of scholarship. This paper proposes a multi-criteria approach, based on the Analytic Hierarchy Process, and reports on a pilot conducted for this purpose.

PRIORITIZATION OF PERFORMANCE MEASURES USING AHP

Revaz George Vachnadze, Free University of Tbilisi

Abstract

The purpose of this paper is to provide an integrated approach that prioritizes   performance measures and critical success factors toward strategic objectives of a firm. Analytic Hierarchy Process (AHP) is used to prioritize Key Performance Indicators (KPIs) and Key Result Indicators (KRIs) as well as Critical Success Factors (CSFs) in the frame of a single hierarchy.

RELEVANCE OF STRATEGIC MANAGEMENT IN ICT BASED SMALL AND MEDIUM ENTERPRISES

Ananta Man Singh, Institute of Engineering, Pulchowk College
Abstract

The focus of this research is to determine the relevance of strategic management process in performance of Information and communication technology (ICT) based small and medium enterprise (SME). For this purpose, an in-depth interview is conducted on a sample of twelve ICT based SMEs. The data collected from the interview are then analyzed by using different tools namely; Political, Economic, Social, and Technological (PEST) analysis, Porter's five forces analysis, Balanced Scorecard (BSC) and Analytic Hierarchy process (AHP). The PEST analysis and five forces analysis gave an overview of the state of the ICT based industry. It was seen that the industry attractiveness of this sector was fairly high with only technological dynamism and bargaining power of clients being two most influential factors to affect the industry. For assessing the relevance of strategy in firm's performance two approaches; financial analysis and BSC analysis were used. Both the financial performance analysis and Balanced Scorecard performance evaluation method strongly indicated the positive influence of strategic management process in the performance of the ICT companies. Finally, an integrated PEST, BSC and AHP approach was used to evaluate the performance of individual studied companies. Based on the measures drawn through PEST and BSC analysis criteria and sub criteria were derived and AHP was used to evaluate the performance of the companies. As the research output, a dynamic strategic management framework is presented as the recommendation for adopting strategic management process in ICT based SMEs. This study demonstrates the utility of an integrated AHP approach, which not only evaluates the performance of ICT based SMEs but also gives insight on the area of

improvement for any individual company.

Session Chair: Milagros Pereyra, University of Pittsburgh, U.S.

2.7 GOVERNMENT POLICY AND DECISION MAKING

10:40 to 11:40 am
Room: KingFisher

AN ASSESSMENT MODEL FOR ENTERPRISE ARCHITECTURE IMPLEMENTATION IN PUBLIC SECTOR ORGANISATION

Nur Azaliah A. Bakar, Universiti Teknologi Malaysia; Harihodin Selamat, Universiti Teknologi Malaysia
Abstract

Despite of many Enterprise Architecture (EA) frameworks and methodologies available, in reality EA implementation is a challenging process. In order to assure a progressive EA implementation, assessment and monitoring mechanism is required. The existing EA assessment approaches are mostly based on checklist or maturity model and design to assess post EA implementation. Less EA assessment is found to cater on the pre and during EA implementation process. This indicates that, lack of systematic assessment mechanism exist especially for pre and during EA implementation phase. Hence, based on the gap identified, this study proposes a priority based assessment model during EA implementation process. This model was tested in three selected case studies and the results indicate this model is well function and accepted by the user.

EMERGING TRENDS IN REAL ESTATE MARKETS: PROPOSAL OF A MULTI CRITERIA MODEL OF INVESTMENTS RISKINESS

Chiara D'Alpaos, DICEA - University of Padova, Italy; Rubina Canesi, DICEA, University of Padova, Italy; Fabio De Felice, University of Cassino and Southern Lazio, Italy; Antonella Petrillo, University of Naples "Parthenope", Italy
Abstract

Emerging Trends Europe's survey suggests that European real estate professionals are still very positive about business prospects in 2015,

though somewhat less confident than they were a year ago. The Italian real estate market is more than a decade undergoing profound changes. In Italy the real estate market is characterized by a lot of investors but they don't trust the government enough yet to deploy capital. The present paper aims to propose a multi criteria approach to evaluate risk and uncertainty in real estate investment valuation procedures.

USING AHP TO DETERMINE MOTIVATIONAL FACTORS DRIVING VOLUNTEERISM IN SPORTS: NIGERIA OLYMPIC SPORT FEDERATIONS EXPERIENCE

Sikuade Oladimeji Jagun, Sol Simon Investments Ltd, Nigeria; Bolajoko Nkemdinim Dixon-Ogbechi, University of Lagos, Nigeria; Elizabeth Marie Haran, Salem State University, U.S.
Abstract

Most scholars are of the view that volunteers are individuals who willingly gave unpaid help, in the form of time, service or skills, through an organization or group. Despite this "consensus", some other scholars observed that contrary to this view, in Nigeria, some of the sports volunteers always expect financial rewards for services rendered. Thus this study used the AHP model to determine the motivational factors driving volunteerism in sports in Nigeria by focusing on the Nigeria Olympic Sport Federations. It adopted the survey research method to study a sample of 14 out of the 23 Nigeria Sport Federations in different cities in Nigeria. Our findings revealed that sports volunteers are mostly motivated by altruistic value, love of the sports, rewards (financial, personal) and personal development (skill, career)

Session Chair: Antonella Petrillo, University of Naples "Parthenope", Italy

5.8 INDUSTRIAL AND MANUFACTURING ENGINEERING

10:40 to 11:40 am
Room: Redstar

ASSESSMENT OF SUPPLY CHAIN MANAGEMENT MATURITY

Claudemir Leif Tramarico, Sao Paulo State University (UNESP), Brazil; Valerio Salomon, Sao Paulo State University, Brazil; Fernando Augusto

Silva Marins, UNESP - Sao Paulo State University, Brazil

Abstract

Maturity models are used to diagnose and identify opportunities to improve Supply Chain Management (SCM) from immature to mature processes, through best practices. This paper contributes by proposing an assessment of SCM maturity that includes the Analytic Hierarchy Process (AHP) and concepts from SCM maturity literature. This assessment was applied in a global chemical company, which allowed capturing the level of SCM maturity for three business units. The results revealed that there are opportunities to improve the SCM maturity for Unit A (upgrading from Level 4 to Level 5) and Units B and C (assessed as in Level 3 of SCM maturity).

MULTI-CRITERIA CLASSIFICATION OF SPARE PARTS

Henrique Kriguer, Sao Paulo State University; Valerio Salomon, Sao Paulo State University, Brazil

Abstract

Spare parts are parts of a piece of equipment that can be replaced when its performance decreases. Manufacturers of capital goods keep several parts in inventory for their production and also to supply their customers with spare parts. ABC classification is a common practice for inventory management. However, the classification of inventoried items by monetary value alone could be dangerous. This work presents a multi-criteria classification with the Analytic Hierarchy Process. The proposed model was implemented in a plant of capital goods located in the Brazilian state of Sao Paulo.

A COMPARISON STUDY OF ABC INVENTORY CLASSIFICATION USING MCDM METHODS

Ergun Eraslan, Yildirim Beyazit University; Yusuf Tansel Ic, Baskent University

Abstract

Current production systems that depend on system complexity, uncertainty in product demand and competitive conditions feel the necessity to carry inventory for the continuity of their operations. Although inventory classification is a very important decision making process for manufacturing companies, the diversity of the product

families makes the inventory classification process a complex and difficult task. The appropriate classification of the items under ABC classification increases both manufacturing efficiency and productivity. Yet, the companies need an ABC classification system to take into consideration multi-criteria and to take control of their inventories. In this study, a comparison study is developed to help the decision makers in their inventory classification decisions with a real case problem. In addition to the ABC classification methods defined in the literature (ADU, AHP, and SCR), some new algorithms (FCM and ANP) are performed in the application. The items are classified under the criteria of price, demand, criticality, and volume. The first three criteria have a quantitative scale where the criticality has a qualitative scale. The different ranking results are then compared using Spearman's rank correlation test to select consistent methods. As the outcome of the test, correlation coefficients of the differences in the rankings are provided. It is seen in the results that the ranking results of ADU, AHP and ANP methods are consistent, and AHP and ANP methods are absolutely consistent. The remaining comparisons do not indicate any consistency. Either the easy and faster methods such as ADU or the detailed methods such as AHP and ANP regarding the related criteria are presented and compared. Significant improvement is ensured using these methods and sensitive results are achieved regarding the company's own features. The quantitative or qualitative criteria can be evaluated in the methods and MCDM is performed in classification to efficient inventory control.

Session Chair: Valerio Salomon, Sao Paulo State University, Brazil

1.9 MULTI-CRITERIA DECISION ANALYSIS THEORY AND METHODOLOGY

12:00 to 1:00 pm
Room: Campanula

EFFICIENCY

Sándor Bozóki, Institute for Computer Science and Control, Hungarian Academy of Sciences
Abstract

A weight vector is called efficient (Pareto optimal) if no other weight vector is at least as good in approximating the elements of the pairwise comparison matrix, and strictly better in at least one position. The least squares method and the logarithmic least squares method always yield efficient weight vectors, while the principal right eigenvector can be inefficient. The talk summarizes some recent results and open questions on efficiency. Lecture slides can be downloaded at
  http://www.sztaki.mta.hu/%7Ebozoki/slides

DECISION SUPPORT ARSENAL USAGE FOR STRATEGIC PLANNING

Sergii Kadenko, Institute for Information Recording of the National Academy of Sciences of Ukraine
Abstract

This paper outlines an approach to strategic planning, based on decision-making support methods. It provides a brief description of a step-by-step procedure, allowing the decision-maker to build a strategy, targeted at solution of some weakly-structured problem or at achievement of some complex goal, influenced by multiple tangible and intangible criteria. In the context of this paper a strategy is defined as the optimal way of resource distribution among specific factors or projects, which influence the main goal of a strategic plan.

EVALUATION OF CONSUMER BUYING BEHAVIOUR FOR SPEFIC FOOD COMMODITY USING FUZZY AHP APPROACH

Gokulananda Patel, Birla Institute of Management Technology
Abstract

The purpose of this case is to understand consumer buying behavior for specific food commodity among Indian consumers. With this aim, a behavioral model centered on explaining consumer attitude towards purchasing food commodity will be presented. A comparative analysis of the results will be done, focusing particularly on the use of fuzzy analytical hierarchy processing (FAHP). Use of Fuzzy Logic will provide a more reliable solution since it is capable of handling vagueness and uncertainty in the database. The study will help the managers to develop a better understanding of customer's food choice behavior and identify their own strengths and weaknesses. Based on this, they can devise strategies to maximize strengths by minimizing weaknesses. The study in this context of understanding consumer behavior is an original contribution to the literature of consumer buying behavior of food commodity among Indian consumers.

Session Chair: Sergii Kadenko, Institute for Information Recording of the National Academy of Sciences of Ukraine

INVITED SPEAKERS II

Special Session
12:00 to 1:00 pm
Room: Great Western 1

THE USE OF MULTI-CRITERIA DECISION ANALYSIS IN EARLY HEALTH TECHNOLOGY ASSESSMENT

Marjan Hummel, University of Twente, Dept. HTSR

AHP AND DATAMINING

Paolo Melillo, Second University of Naples

Session Chair: Marjan Hummel, University of Twente, Dept. HTSR

6.10 BUSINESS AND INNOVATION SYSTEMS

12:00 to 1:00 pm

Room: Great Western 2

SELECTION OF SUSTAINABLE ENERGY SYSTEMS FOR NEPAL USING ANALYTIC HIERARCHY PROCESS

Prabal Sapkota, Kathmandu University, Dhulikhel, Kavre, Nepal; Martina Pokharel, Freelancer; Madhav Prasad Pandey, Kathmandu University, Dhulikhel, Kavre, Nepal

Abstract

Selection of sustainable energy systems is always problematic. The scenario becomes more complex when there are constraints in economy and several alternatives are feasible. One has to consider multiple criteria, which could prove to be very crucial during the selection process. It is a case of Multi Criteria Decision Making and AHP has already proven to be a useful tool in such scenarios. In this study, various factors, sub-factors and alternatives associated with sustainable energy development in Nepal have been identified and AHP has been used to prioritize these alternatives. The analysis has been done from the perspective of various stakeholders who could be game changers for the development of energy systems in Nepal.

SUSTANABILITY MARKETING MIX FOR FOREST PRODUCTS VALUE CHAINS

Omid Hosseinzadeh, Assistant Professor; Marzieh Hajjarian, Assistant Professor/Natural Resources/Urmia University; Reza Abdi, Professor/Bradford University

Abstract

Considering the growth in population, the need for wood consumption also increases. The rapid progress of science and technology doubles the wood consumption, which needs supply, and at a glance, mainly from the forests. Forests for many reasons have faced decrease in production despite this extreme needs for wood. Given the problems of indiscriminate harvesting of wood from the forest to be continued, strategies for sustainable supply of raw materials for forest products industries should be considered. In this study, to determine a reliable solution the analytic network process for decision making with benefits, opportunities, costs and risks is used. The preliminary results show that combined alternative strategies are more preferred to the other

alternatives.

THE EVALUATION OF PREFERENCES OF CONSUMERS FOR COFFEE SHOP CHAINS IN TURKEY

Gozde Kadioglu, Student- Istanbul Technical University; Ilker Topcu, Istanbul Teknik Universitesi, Turkey

Abstract

This study aims to evaluate the preferences of consumers for coffee shop chains in Turkey with respect to the social, economic, and brand equity aspects. The research provides a tool to determine factors affecting coffee shop chain preferences, to prioritize these factors, and also to find the most preferred coffee shop chain by Turkish university students. Based on the literature review, the main criteria are identified as social dimension, environmental aspect, and brand equity. The problem on hand can be treated with AHP. The finding of the study reveals the most preferred coffee shop chain as Starbucks and the most important criterion as environmental aspect.

Session Chair: Ilker Topcu, Istanbul Teknik Universitesi, Turkey

7.1 ADVANCES IN OPERATIONAL RESEARCH

12:00 to 1:00 pm
Room: KingFisher

THE METHOD OF TIME GRANULARITY DETERMINATION ON TIME SERIES BASED ON STRUCTURAL SIMILARITY MEASURE ALGORITHM

Gao Xuedong, Donlinks School of Economics and Management University of Science and Technology; Chen Hailan, Donlinks School of Economics and Management University of Science and Technology Beijing

Abstract

The research of time granularity determination on time series is an important problem in data mining research. With the rapid growth of data quantity, it is necessary to obtain valuable information quickly and accurately by time series data mining. In order to solve the problem, in

this paper, a method of time granularity on time series is proposed based on structural similarity measure algorithm. Firstly, according to the method of fluctuation point recognition we can get fluctuation point sequence. Next, Haar wavelet transform is used to identify the turning point of the original time series to get wavelet decomposition sequence. Then, a new structural similarity measure algorithm is proposed to calculate the similarity between fluctuation point sequence and wavelet decomposition sequence. At last, the similarity turning point is determined as the optimal time granularity. The computational complexity of the algorithm is calculated, and the experimental result shows that the proposed algorithm can effectively determine the time granularity of time series. Before data mining, we can select a subsequence varies stable to analyze by applying the proposed algorithm to determine the optimal time granularity, then use the time granularity to do data mining research for the original time series.

THE NEW STAGE OF DATA MINING RESEARCH: VARIABLE METRIC DATA MINING

Ai Wang, Donglinks School of Economics and Management, University of Science and Technology Beijing; Gao Xuedong, Donglinks School of Economics and Management, University of Science and Technology Beijing

Abstract

On the current research stage, there are essential differences between human intelligence and mechanical intelligence. It is effortless for human intelligence to conduct continuous learning and create things. However, it is hard for mechanical intelligence to start qualitative change without depending on quantitative change, or to move from one concept (essence) directly to another. The current data mining research has the following problems: (1) it takes the single top-down or down-top path; (2) it is an open-loop process, which means the research ends up with solving the data mining tasks without automatically learning and memorizing the mining results; (3) it requires the participation of people, for example the determination of the initial parameter values.

VULNERABILITY ASSESSMENT IN MEGALOPOLIS: ANP-MAS MODELING APPROACH FOR MEXICO CITY

Luis Antonio Bojórquez-Tapia, LANCIS UNAM, Mexico; Hallie Eakin, School of Sustainability, Arizona State University; Marco Jansen, School of Sustainability, Arizona State University; Andrés Baeza, School of Sustainability, Arizona State University

Abstract

The advances in the development of the MEGADAPT model (MEGAcity-ADAPTation model) are presented. MEGADAPT simulates the dynamic interactions underlying Mexico City´s vulnerability to socio-hydrological risks. The ANP is used to (1) depict the mental models that determine the actions of diverse social actors, and (2) develop the decision rules to be incorporated into an multi-agent based model (MAS).

Session Chair: Ai Wang, Donglinks School of Economics and Management, University of Science and Technology Beijing

5.9 INDUSTRIAL AND MANUFACTURING ENGINEERING

12:00 to 1:00 pm
Room: Redstar

ANALYTIC HIERARCHY PROCESS BEST APPROACH IN SEQUENCING OF ORDINARY DISTILLATION COLUMNS

Omar Jair Purata-Sifuentes, Universidad de Guanajuato

Abstract

Analytic hierarchy process (AHP) ratings mode were applied combined with heuristics rules for choosing the best sequence of ordinary distillation columns in a five component mixture. Categories for each heuristic according to its compliance in each sequence, were defined and pairwise compared. At the same time, the heuristics rules were equally weighted to cancel conflict among them. The AHP ratings mode approach proved to be effective in selecting the best alternative, compared against the results obtained with more complex and rigorous methods.

SELECTION OF PROJECTS TO IMPLEMENT A MANUFACTURING STRATEGY

Luis Quezada, Department of Industrial Engineering, Universidad de Santiago de Chile; Maria Dolores Gracia, Faculty of Engineering, Universidad Autonoma de Tamaulipas; Pedro Palominos, Department of Industrial Engineering, Universidad de Santiago de Chile; Astrid Maria Oddershede, usach, Chile; Guillermo Fuentes, Universidad de Santiago de Chile

Abstract

This paper presents a quantitative method to support the decision making process within the formulation of a manufacturing strategy. It allows the selection of projects to implement the strategy. It combines the Analytic Hierarchical Process (AHP) and Linear Programming (LP). AHP is used to estimate the priority of the criteria for selecting projects and LP is used to select those projects that optimizes the contribution to the manufacturing strategy. The method was implemented in a manufacturing company and managers found that the tool was appropriate in the process of formulation of a manufacturing strategy.

A CRITICAL COMPARISON OF MULTI-CRITERIA METHODOLOGIES FOR SUPPLIER SELECTION

Giuseppe Bruno, University of Naples "Federico II"; Francesco Ciardiello, University of Sheffield; Emilio Esposito, University of Naples "Federico II"; Andrea Genovese, University of Sheffield; Carmela Piccolo, University of Naples "Federico II"

Abstract

In the last decades, the supplier selection problem has received extensive attention in the literature. Most of all, an increasing number of researches has been devoted to the development of different methodologies (based on multi-criteria decision-making paradigms) to cope with this problem. Nevertheless, while the number of applications is growing at a steady rate, there is little empirical evidence of the practical usefulness of such tools. In many cases, proposed models are tested on generic applications, mainly including ad-hoc built numerical examples, with less emphasis on issues and problems emerging in the actual implementation in real-world scenarios. The result is a clear dichotomy between theory and business practice. In other words, the

literature is rich of models which present a variety of approaches that are rarely used to solve real problems in the corporate practice; also, it is not clear what are the advantages and the disadvantages of specific techniques, in terms of performances related to both computational results and decision support. Considering this evidence, the goal of this paper is to evaluate the applicability to real-world problems of the two main approaches proposed in the literature to deal with the SS, the Analytic Hierarchic Process (AHP) and the Fuzzy Set Theory (FST). After a thorough review of the literature, starting from the characteristics of AHP and FST approaches, and from their combination in a hybrid framework, we compare the performance of these three methodologies for dealing with the Supplier Selection Problem on the basis of a set of randomly generated numerical examples, in order to gain insights about differences and similarities, from a computational point of view, emerging both in the implementation process and in the final recommendations provided by the methods. Then, an in-depth case study is analysed, along with a discussion about managerial implications.

Session Chair: Andrea Genovese, University of Sheffield

LUNCH & CLOSING CEREMONY

1:00 to 2:30 pm
Room: Atrium

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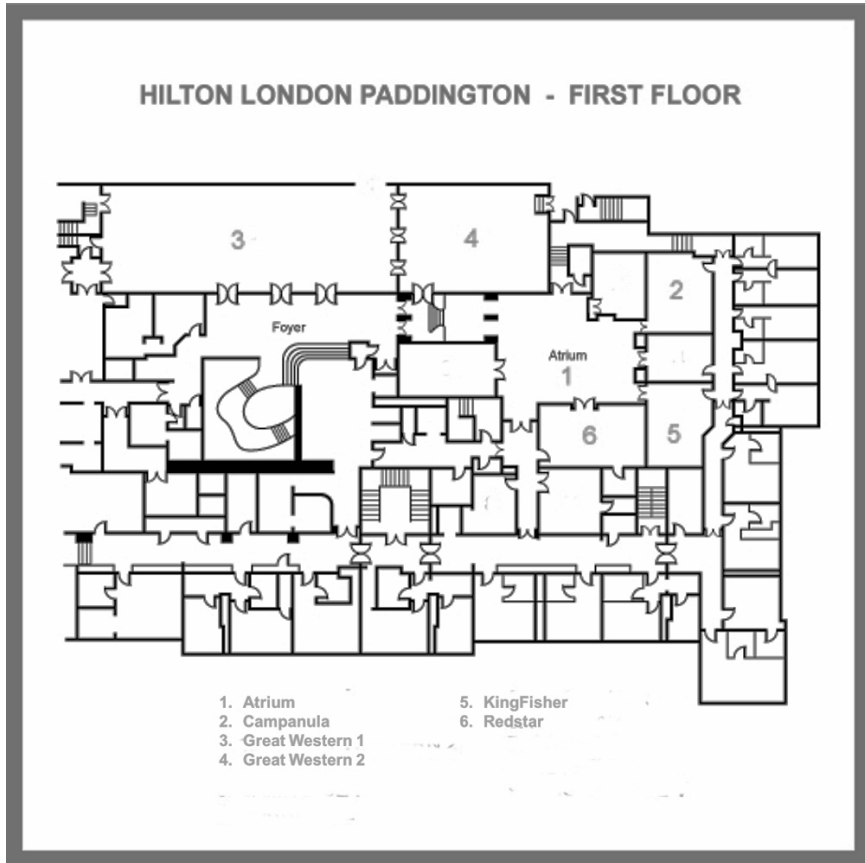
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